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NATURAL HISTORY

OF THE

FISHES

OF

MASSACHUSETTS,

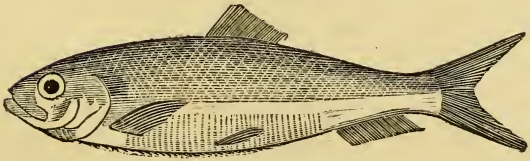
EMBRACING A PRACTICAL ESSAY

ON

ANGLING.

WITH FIFTY-FOUR WOOD ENGRAVINGS.

BY JEROME V. C. SMITH, M.D.



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WILLIAM D. TICKNOR.

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TO THE

HON. JOSIAH QUINCY,

This Volume

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RESPECTFULLY INSCRIBED

BY THE AUTHOR.

PREFACE.

In the course of several years residence on a small island in Boston harbor, the author became interested in the study of ichthyology. The daily opportunities which the locality afforded of examining a large portion of the species described in the following pages, resulted, three years since, in a catalogue of the fishes of the Northern States; — but within a few months past, the manuscript has been revised, and that part of it is now presented, which more particularly relates to Massachusetts.

There are many unfortunate errors, and repetitions, which escaped notice, till it was too late to make the corrections. The distance at which the writer resides from the compositor, and the extreme difficulty, oftentimes, of going to the city, against wind and tide, are some, among many apologies, that might be offered in extenuation of these vexatious deformities. A table of errata, however, is inserted at the end.

With respect to the engravings, they are far short, in many instances, of what was anticipated. Some of

them are beautifully and accurately executed; but others are miserable caricatures. The artist was young and inexperienced, — and when he would have willingly made a second drawing, the press could not be kept in waiting. As a revised and enlarged edition, embracing the natural history of all the fishes of the North, is contemplated, the engravings in that will not only be more numerous, but correctly delineated on copper.

No pretensions are made to originality; the object has been to collect and preserve such facts as are already known in this interesting department of local Natural History. The remarks and observations of other writers have been freely introduced, wherever they were pertinent to the subject under consideration.

The collection of native fishes, from which the scientific arrangement has been made, will probably be deposited with the Boston Society of Natural History. With a little exertion on the part of the members, it might become a most valuable ichthyological cabinet.

Those gentlemen who have so promptly and kindly forwarded specimens from various sections of the State, will please accept our sincere thanks. To David Ecklev, Esq., of Boston, the author is particularly indebted. His exact knowledge of the habits and characters of the aquatic tribes, and his truly philosophical energy, demand the warmest gratitude. All that is interesting to the practical angler, in the second part of the volume, originated with that gentleman.

The services of Capt. J. P. Couthouy, in procuring and preserving the marine fishes of this coast, during a period of several years, with reference to a correct classification, also place the writer under lasting obligations.

To Solomon Lincoln, Esq., acknowledgments are made in another place, for his valuable services.

A digest of the Fishery Laws, by the Hon. John Pickering, to have been annexed, and to have constituted part the third, was not seasonably completed, and may therefore be expected hereafter, should the present Essay meet the approbation of the public.

J. V. C. Smith.

Quarantine Ground,
Port of Boston, May, 1833.

THE

IMPORTANCE

OF

THE FISHERIES.

It was an opinion of Pliny, "that nature's great and wonderful power is more demonstrated in the sea than on the land." This power is displayed in forms of exquisite beauty, and awful grandeur. It is exhibited on the mountain wave, and in the unexplored caverns of the deep. It appears, in an eminent degree, among the myriads of tribes which traverse the ocean with a velocity far surpassing that produced by human power, equalling almost that of the tenants of the air. Science has not so far penetrated this field of agreeable research, as to induce us to suppose, that we have anything like a complete history of the watery tribes. We have indeed new

names, but with their increase, we have not a corresponding knowledge of the habits and character of the marine inhabitants. Linnæus has given names to upwards of four hundred species; yet it is probable that the recesses of the fathomless sea contain a great variety of tribes never seen by man. Imagination has frequently been busy in tenanting these unexplored regions with unreal creations, and superstition has exercised her inventive faculties to impose a belief in their existence, on credulous and inexperienced minds.

It would be an agreeable employment to enter into a detail of the interesting facts connected with this branch of Natural History. It would afford a rich gratification to the inquiring mind, to discover the singular adaptation to its state of existence, which is to be found in this class of animated nature, and to witness the order and beauty which here, as well as elsewhere, is stamped upon the works of the Almighty.

The object, however, in this introductory part of the following work, is rather more of a practical nature, than an examination of the history of the marine tribes; rather to exhibit the importance of the fisheries as a matter of sound political economy, than to enter upon the subject with the enthusiasm which would be felt alone by the man of science, — to show how

much individuals and even nations may, from inconsiderable sources, derive comfort, strength and power.

To increase the physical and moral power of a nation, to the greatest possible extent, regard must be had to the proper adaptation of the means to produce desired results, under every variety of circumstances. Education must, in some measure, be adapted to the genius of the people, in order to give the greatest efficacy to their institutions. Even forms of religion must be shaped to correspond with the prevailing dispositions, habits and taste. A grave, sober people will prefer great simplicity in their forms of worship, and others, whose local circumstances place them more under the dominion of the imagination, will avoid whatever appears to them cold and austere, and seek to elevate their feelings and indulge their taste by more showy and imposing observances. So, also, in relation to the ordinary pursuits of life, employments which in some nations tend most to promote general prosperity, in others are found not to be adapted to their habits or circumstances.

It will often occur also, in a country like ours, full of resources — putting forth its strength in every variety of form, where under favorable auspices, any individual with common skill and

prudence, if he but throws himself upon the current, will be sure of being borne on to prosperous results, — that those pursuits which can be turned to the quickest account in building up fortunes, are followed to an unreasonable extent, and that the result, under a change of circumstances, is frequent distress and disappointment.

The avidity with which the Spanish adventurers rushed into the pursuit of the glittering treasures of South America, absorbed all inclination to cultivate those practical arts, upon which experience shows, that the prosperity of a nation mainly depends; and its operation was to weaken and undermine the very foundations of the strength and glory of the Spanish monarchy.

A prevalent desire among a people to gather riches too fast, and to swell their fortunes under the influence of a feverish excitement, by means ill adapted to employ all the powers whose exercise contributes to ultimate and permanent good, is frequently cherished by an ignorance of the true principles of a wise political economy. We should not think it strange even in our own country, where so much has been done, and is now being done, to ascertain the mutual connexion and dependence of the arts of life, and their bearing on general interests. We should not think it strange if the importance of some of the humbler

and less attractive pursuits should be overlooked or undervalued.

It is for these reasons, that we have been induced to comply with a request to offer some remarks on the history, nature, extent and importance of the Fisheries.

In the language of an early historian of Virginia,* "therefore, honorable and worthy countrymen, let not the meanness of the word fish distaste you, for it will afford as good gold as the mines of Guiana or Potosi, with less hazard and charge, and more certainty and facility."

Sir Henry Wotton remarked of fishing, that it was "a rest to the mind, a cheerer of his spirits, a diverter of sadness, a calmer of unquiet thoughts, a moderator of passions, a procurer of contentedness; and that it begat habits of peace and patience."

"The Romans, in the height of their glory," says the celebrated Walton, "made fish the mistress of all their entertainments," of which the value and importance are confirmed not only by their historians, but by their essayists and bards.

It is not for us, however, to speak of the delicious entertainments which may be provided from the treasures of the deep; we shall remark

* Smith.

on them with the more useful design of fostering the fisheries as a branch of industry, as wise economy for a state or nation like our own.

The first knowledge we have of the fisheries on the American coasts, was in the year 1504, when vessels from Biscay, Bretagne and Normandy, were employed in the cod fishery, on the coasts of Newfoundland. In 1517, the French, Spanish and Portuguese had vessels engaged in this fishery. England had then one ship employed in this lucrative trade. Prince was in error when he dated the commencement of the English fishing trade in 1560, because in 1548, an act was passed by Parliament, prohibiting the admirals and others from making exactions in money or fish, from English fishermen, going on the service of fishing at Newfoundland. This was the first act of parliament which had any relation to this country; and it indicates the sagacity of the English statesmen, in protecting a trade which has ever since been of great value to their nation.

In 1578, England employed fifteen vessels in the trade, France one hundred and fifty, Spain one hundred, and Portugal fifty. In 1615, the number of British vessels had increased to two hundred and fifty, and those of other nations to four hundred.

It is an interesting fact to us, that had it not

been for the treasures of the sea, the pilgrim fathers of New England would have probably perished by famine. The pious Brewster and his associates lived for months almost entirely upon fish, and his daily thanks were given, that he and his associates could "suck of the abundance of the seas, and of the treasures hid in the sands." The infant colony of Plymouth was nourished into strength and power by the trade of fishing. It was, for a long series of years, one of the principal sources from whence they derived sustenance for themselves, and articles of traffic, in exchange for which they obtained commodities necessary for their comfort and protection. It is due to that noble race of natives, who were afterwards almost entirely swept from New England by pestilence and war, here to state, that to them were our fathers indebted for their first knowledge of the manner of taking fish, as well as of the rudiments of Indian agriculture.

It is a singular and an interesting fact, that our beautiful system of free schools took its rise in Plymouth Colony, from the fisheries. The subject was commenced in 1663, in the Colony Court, by the following proposition: "It is proposed by the court unto the several townships in this jurisdiction, as a thing that they ought to take into serious consideration, that some course may be taken

in every town, that there may be a school-master set up to train up children to reading and writing." In 1670, "the court did freely give and grant all such profits as might or should accrue annually to the colony, for fishing with nets or seines, at Cape Cod, for mackerel, bass or herring, to be improved for and towards a *free school*, in some town of this jurisdiction, for the training up of youth in literature for the good and benefit of posterity, provided a beginning be made within one year after said grant, &c." This school was immediately established at Plymouth, and was supported by the proceeds of the Cape fishery, until 1677, when they were distributed among several towns for the same purpose. After the union of Massachusetts with Plymouth, in 1692, this fishery became free.*

Many of the towns in the colony of Massachusetts began at an early date to cultivate their river fisheries. Wears were erected upon the rivers in Watertown and Roxbury, as early as 1631. In 1641, we learn from Winthrop, that 300,000 dry fish were sent to market.

The English commenced the whale fishery at a very early period. Before the American Revolution, it had grown into an important branch of trade, then considered of great value to the na-

* Deane's History of Scituate.

tion; yet the whole amount of tonnage employed did not equal that of the port of New Bedford at the present time. The enterprising Hollanders, however, surpassed the English in this trade, and during nine years preceding the year 1778, their ships bore to those of Great Britain the proportion of two to one.

Previously to the American Revolution, the cod fishery of Massachusetts employed 28,000 tons of shipping, and four thousand seamen. The annual value of their industry and enterprise was about $1,000,000.

In 1775, Great Britain deeming the various fisheries of essential importance to the colonies, and like an unnatural parent, desirous of enforcing obedience by arbitrary and oppressive measures at the instigation of Lord North, passed the obnoxious act, prohibiting the colonies the exercises of the right of fishery on the banks of Newfoundland. This unwise act of arbitrary power drew forth the powerful invectives of Fox and Burke, and sixteen peers regarded it with so much displeasure as to enter their protest against the passage of the bill. It was in a debate preceding the passage of the act, that in allusion to the enterprise of the Americans in the whale fishery, the eloquent Burke said —

"While we follow them among the tumbling

mountains of ice, and behold them penetrating into the deepest frozen recesses of Hudson's and Davis's Straits, while we are looking for them beneath the Arctic circle, we hear that they have pierced into the opposite region of polar cold, that they are at the Antipodes, and engaged under the frozen serpent of the south. Faulkland island, which seemed too remote and romantic an object for the grasp of national ambition, is but a stage and resting place for their *victorious industry*. Nor is the equinoctial heat more discouraging to them, than the accumulated winter of both poles. We know that while some of them draw the line or strike the harpoon on the coast of Africa, others run the longitude, and pursue their gigantic game on the coast of Brazil. No sea, but what is vexed with their fisheries. Neither the perseverance of Holland, nor the activity of France, nor the dexterous and firm sagacity of English enterprise, have carried their most perilous mode of hardy industry to the extent to which it has been pursued by this recent people, who are still in the gristle, and not hardened into manhood."

The war of our independence, however, gave a new direction to the "*victorious industry*," which was carried to an extent which far surpassed "the sagacity of English enterprise," whether in the

cabinet or the field. It was the spirit of men trained to such daring pursuits, accustomed to perilous undertakings, which, in the course of eight years, obtained from Great Britain a recognition "as a right" of that which had been withheld, at the commencement of that period, as a *privilege*, to be dispensed at the pleasure of parliament.

The restoration of peace revived the fisheries of this country. The state of Massachusetts, alive to its true interests, and desirous of strengthening this essential branch of national industry, made a representation to Congress in 1790, asking some encouragement in the form of bounty, on exported fish. This was granted, and a few years afterwards a bounty was allowed to vessels employed in the business for a given length of time. This gave a stimulus to the trade, and up to the period when restrictions were placed upon our commerce, it gradually increased in value and extent. In 1807, 71,000 tons of vessels were employed in the cod fishery alone, and the average value of exports from this country, of the productions of the sea for that and the four preceding years, was estimated at $3,000,000. From that time, until the close of the last war, all our fisheries diminished. With the return of peace, they revived, and the very next year 68,000 tons of vessels,

employing 10,000 fishermen, were again upon the ocean, — thus exhibiting the sagacity and promptness with which the sons of New England avail themselves of such circumstances as affect individual or public prosperity.

This branch of the fisheries has been pursued since that period, with a success somewhat changeable, but within the few last years, apparently more sure and increasing.

The enterprise with which our fisheries have been prosecuted has attracted the attention and excited the jealousy of our colonial neighbors. A late writer* upon the British dominions of North America, in remarking on their fisheries says, "By encouraging bounties to secure the adventurer against the serious loss consequent upon an unsuccessful voyage, the number of vessels would soon be considerably increased, and this important branch of trade so effectually carried on by the hardy inhabitants, as to compete in some degree at least, if not rival, that of our American neighbors, who are now almost in the exclusive enjoyment of it, and carry on their enterprising fisheries at the very mouths of our bays and harbors."

The inhabitants of the British dominions possess very great facilities for the promotion of this

* Bouchette.

trade. They have a country filled with a heavy growth of the most valuable timber for the building of vessels, and they derive no inconsiderable advantages from their proximity to the fishing grounds. They can, and frequently do, in some districts, carry on their fisheries in open boats of cheap construction, within a few miles from shore. The bounty allowed by our government to encourage the trade, being, in part, intended as a drawback for duties paid on imported salt, can scarcely be an adequate cause for the superior success of our fisheries over those of the British, even on their own shores. The colonial fishermen derive a similar encouragement from the importation (free of duty) of the salt which they consume. The form in which they receive encouragement is different, but its effect is designed to be the same. The secret of the success of our fishermen lies in their greater activity and perseverance. A late English traveller in Nova Scotia, was surprised to find the bays swarming with Marblehead boats, before the Nova Scotians had moved in the business. Burke acknowledged the superiority of the hardy fishermen of New England, more than half a century since, a superiority which they have ever since maintained, and will continue to maintain unless our government should withdraw the protection and reward

which now in some measure give a stimulus to increased exertion to extend this lucrative branch of our commercial pursuits.

Another branch of our fisheries which has grown up within a few years is deserving consideration, as an object of great importance to the State and nation, viz: — the Mackerel Fishery. This business was, as before stated, pursued to some extent in the early settlement of the country, but the whole annual profit of the fishery of Cape Cod, when its proceeds were appropriated for the support of a free grammar school, was but from £30 to £40 annually. This fishery included Mackerel, bass, and herring. It appears from the historical collections, that mackerel were first taken in any considerable quantities in seines by moonlight. This method is supposed to have been first adopted by Mr Isaac Allerton and his associates, at Nantasket, as early as 1626.* Fishing by torch-light is common on the St Lawrence. The scene as witnessed from the banks of that broad and beautiful expanse of water, is described as almost of a fairy nature. The flashing of the lights upon

* "1671 — John Prince and Nathaniel Bosworth, of Hull, petition the General Court of Plymouth for liberty to fish at Cape Cod for Mackerel, they having discovered a method of fishing with nets by moon-light." — *Thacher's History of Plymouth.*"

its glassy surface spread out before the spectator, with its edges fringed by a dark mass of huge forest tress, sweeping to the very brink of the river — with the song of the voyager floating over the smooth and silent waters, may well fill the mind with delightful emotions.

To show the superior success of our Mackerel fishery over that of Nova Scotia, it is merely necessary to advert to a few facts in relation to the mode and circumstances under which the colonial fishery is carried on. In Nova Scotia, mackerel are taken by seining with great facility. The Surveyor General of Lower Canada states in his late interesting work, that 1000 barrels have been taken in a seine at one draught. At the commencement of the season, the fisherman obtains permission of the proprietor of the beach to erect his hut and occupy a certain space for his boats and nets, for which he pays, at the end of the season, a certain part of the fish taken. The fishery is usually held in shares, — the owner of the boat and nets taking one part of the proceeds, and the fishermen the remainder. Some of the proprietors receive each 2000 barrels of mackerel annually for the use of their fishing grounds. Notwithstanding these facilities and advantages on the side of the Nova Scotians, the fishermen of New England have entered into the business with great spirit

and zeal; and it bids fair to become one of our chief and most permanent sources of prosperity. So rapid has been the increase of the business, that the eagle-eyed friends of retrenchment can scarcely keep pace with its progress, in order to prune off any extravagant allowance which a prosperous year of fishing might bring to the Inspector General.

In 1803, Massachusetts passed a law providing for an inspection of fish. In the following year, the number of barrels of mackerel packed in Massachusetts, was 8,079. The number gradually increased until 1808, when after a temporary declension, the business extended, and in 1811 the number of barrels packed was upwards of 19,000. The war almost entirely destroyed the business. In 1815 it revived, and the returns of the next year show that 16,000 barrels were packed. In 1820, the increase was so rapid that the number of barrels packed amounted to 236,243. This was before the separation of Maine. The number packed in Massachusetts the subsequent year, was 111,009, — but in 1825 it was again increased to an amount exceeding that of the whole state at the time of the separation, and in 1831 there were packed in this State 348,750 barrels; and the mere increase from the preceding year, amounted to a greater number than were packed in the sev-

en years subsequent to the passage of the Inspection law.* The number of vessels employed in 1831 did not fall much short of 400, and the number of men employed probably exceeded 4000. If we include those who are employed in building the vessels, manufacturing the barrels, making or importing the salt, packing the fish, transporting them to market, and vending them, we can form some opinion of the extent of the advantages of this trade to the community. The probable value of the proceeds of the mackerel fishery for 1831, exceeded one million and a half of dollars.

There is no doubt but the fisheries of Massachusetts have derived great advantage from our Inspection laws. Whatever plausibility there may be in a specious theory, which is sometimes put forth and urged with much ingenuity and zeal, that these laws are a restriction upon trade, still there is no doubt as to their great practical benefit, both to purchaser and seller. The fishermen of Massachusetts have acquired for their produce a high character, under the operation of these laws, which commands for them regular prices and certain sales. The public are protected, at the same time, from imposition in purchasing an article with

* The returns for 1832 were not completed when this sketch was prepared. Owing to temporary causes, the "catch" falls much short of that of the preceding year.

which they are not familiarly acquainted, and which they would not purchase at all, were it not for the character stamped upon them by the laws of the State. It is true that the laws have in some instances been carelessly enforced, but they give a remedy to the injured — it is true also, that there have been frequent attempts at vexatious and almost farcical legislation on this subject, which have been promptly rejected by the Legislature; yet these attempts to interfere to an unnecessary extent, with the occupation and business of citizens, has sometimes created disgust against the laws, and rendered the whole system odious to many.

The Whale fishery, at the present time, attracts unusual attention, both in Europe and America. It is a wild and romantic employment. It requires patience, perseverance, intrepidity — it is full of interest and excitement. We are glad to know that the object of the chase affords a rich reward to those who fear not a perpetual conflict with the elements, and continually grapple with danger in pursuing their game. "The congratulation and enjoyment resulting from victory, are scarcely to be equalled in any other human pursuit." We have noticed the early history of this fishery in our previous remarks. It is now rapidly increasing. The number of barrels of sperm oil which have been imported into the Uni-

ted States since the late war has not fallen short of 1,000,000 barrels. Nearly one third of the quantity now imported, is consumed in manufacturing establishments. The quantity of whale oil imported has been about the same as of sperm. The number of ships employed in the whale fishery, the past year, was upwards of 300. The number of persons employed to navigate them exceeded 6000. It is well known, that these vessels are chiefly owned, built and manned in Massachusetts. They are supposed to require to equip for sea, 6000 tons of iron hoops for casks, 18,000 bolts of sail cloth, 36,000 barrels of flour, 30,000 barrels of beef and pork, 6,000,000 staves for casks, besides numerous other expensive articles of equipment and provisions. They require annually about 700,000 pounds of sheathing copper.*

It is a fact highly honorable to the enterprising men engaged in this hazardous, daring and romantic employment, that they can compete so successfully with those of other nations, while they encourage their fishery by a protective duty and liberal bounties. The protective duty of Great Britain is nearly double our own.

There is probably no branch of business more directly calculated, in all its ramifications, to enrich a state, than this. It gives employment to me-

* Boston Courier.

chanics and artizans of almost every description — wherever it extends itself, it scatters opulence. In peace, it is rearing up a hardy race of navigators, who with souls steeled by unremitted action — almost naturalized to the element on which they pursue their gigantic game — accustomed to buffet the tempest and the storm on every ocean, will not hesitate, in war, if it must come, to display the same daring intrepidity, the same recklessness of danger, the same love of country and of home, in defending their dearest rights. It would be gratifying to sketch, in detail, the animating scenes which are presented in this employment, — to portray the exciting contests by man for the mastery over the monsters of the deep — and to describe the skill and ingenuity by which victory is obtained — but the limits which we have prescribed to ourselves will not permit us to continue the subject further.

The remaining fisheries of the Commonwealth, as subjects of general interest, are in a great measure losing, and in some instances have lost their importance. The beautiful *salmon*, which Isaac Walton accounted the king of fish, is a rare visitor to our waters, although we find them occasionally exhibited by those who cater for the public taste.

The statutes in relation to our interior fisheries, including those of the Colonies of Massachusetts

and Plymouth, contain many provisions as singular as they are absurd. In the almost endless variety of detail, however, certain general principles have been settled in a manner to prevent angry and unprofitable litigation.

In relation to our sea-coast fisheries, the statutes and general principles are highly important, and new acts of legislation should be adopted with great caution. Our citizens would regard with extreme sensitiveness any enactments which might tend to abridge, under the appearance of enlarging their privileges. Whatever may be the right, our hardy and enterprising fishermen, for the sake of an exclusive privilege of fishing on our own shores, would scarcely wish to abstain from carrying their successful industry into the mouths of the bays and harbors of New Brunswick and Nova Scotia.

In relation to the general subject, however, it must be apparent, that the fisheries of this Commonwealth are of vital importance to its interests. There are many views of it, showing the dependance of other branches of manufactures and trade on them, which cannot now be presented. The direct advantages are numerous. Taking into consideration the amount of capital invested in them, they yield a fair income which is divided among a large number of persons, contributing to

the support of no inconsiderable portion of our population, who but for this employment, might be left in destitute circumstances. Perhaps no trade — no pursuit with the same amount of capital, employs so large number of our citizens, and gives more encouraging impulses to enterprise and exertion. The employment is not unfriendly to the morals of those who engage in it. It has been remarked, that every person on board a fishing vessel, has an interest in common with his associates. Their reward depends upon their industry and enterprise. Much caution is observed in the selection of crews of fishing vessels, and it often happens, that every individual is connected, by blood and the strongest ties of friendship. They are remarkable for their sobriety and good conduct, and they rank with the most skilful navigators.

The celebrated Talleyrand, in speaking of our fishermen, said, " Excepting the whalers, fishing is an idle employment, requiring neither courage nor skill; the fishermen do not venture more than two leagues from the coast, — the fisheries do not furnish a nursery for seamen, they have no attachment to their homes, they are cosmopolites, and a few codfish more or less determine their country." These remarks only show how ignorant a learned man may be of facts which fall under the observa-

tion of all who have any curiosity to examine the subject.

Bouchette says, "The daring enterprise of the fisherman is known on this side the ocean, as well as the other — it would be idle to dwell upon the boldness, the activity, the extreme collectedness and presence of mind, that characterize that class of navigators, who apparently naturalized to the elements, buffet the heavy swell of the Atlantic, in their frail fishing smacks and vessels, and seem to laugh the ocean storms to scorn."

It might be enough to quote one foreign writer against another, to show the absurdity of the allegations of the French diplomatist — but who that has seen upon the shores of New England, beautiful villages springing up under no operating cause but the "silver drawn from the sea," filled with seminaries for learning and temples for the worship of God — abounding with all the means for social improvement and intellectual culture — the wharves laden with the rich productions of the ocean — the harbor whitened by the canvas of the enterprising fishermen, and does not know that the declarations of Talleyrand are the very reverse of the truth! Who does not know, that when war swept the barque of the fisherman from the ocean, that he was among the foremost to enrol his name under the flag of his country — and gallant-

ly to stake his life upon a contest for what he conceived duty to that country required? Who does not know, that the fishermen of New England, under a Tucker, (himself a fisherman), and a Hull, performed for their country the most brilliant achievements, and displayed at the same time, all the noble qualities of the citizen and the patriot?

Massachusetts, with her intelligent population, her advances in manufactures and the arts, — her enterprising commerce and flourishing fisheries, contains within herself, all the elements of strength and power. A minute examination of the mutual bearing of all these interests, will show how important it is, that each should be sustained by the protection of the others. The inhabitants of the sea-board will exchange with those of the interior, the products of the ocean and foreign climes, for those of our native soil, with mutual advantage and profit. The interior will naturally seek channels for the conveyance of its surplus productions to the sea-board, for the purposes of exchange, and thus private interests, if not public sentiment, will in obedience to the dictates of a wise and prudent policy, open avenues which will at the same time develope the resources of the State — bind together the various local interests — and quicken the circulation of intelligence and good feelings.

Small though she is in territory, what State,

more than Massachusetts, possesses within herself all that constitutes the moral and physical strength of a Commonwealth? Where is industry more manfully displayed and better rewarded? We think no where on the face of the earth. It is for us then to examine all the capacities of our ancient Commonwealth — to study well all her interests, — to procure for them all the protection of good laws, — to overlook none of her important, nor inconsiderable branches of industry, and above all, to take good precaution to observe the principles and to obey the precepts of that noble generation of men, *who appropriated the proceeds of the Cape Cod fishery to found our beautiful system of free schools.**

* Some of the uses to which the productions of the sea may be applied, and which are not adverted to in the preceding sketch, appear by the following extract from the Barnstable Journal, of Feb. 7, 1833.

"Feeding Cattle on Fish. The cattle at Provincetown feed upon fish with apparently as good relish as upon the best kinds of fodder. It is said that some cows, kept there several years, will, when grain and fish are placed before them at the same time, prefer the latter, eating the whole of the fish before they touch the grain. Like one of old, we were rather incredulous on this subject, till we had the evidence of ocular demonstration. We have seen the cows at that place boldly enter the surf, in pursuit of the offals thrown from the fish boats on the shore, and when obtained, masticate and swallow every part except the hardest bones. A Pro-

vincetown cow will dissect the head of a cod with wonderful celerity. She places one foot upon a part of it, and with her teeth tears off the skin and gristly parts, and in a few moments nothing is left but the bones.

The inhabitants of Provincetown are not the only people who feed their cattle upon fish. The nations of the Coromandel coast, as well as in the other parts of the East, practise feeding their flocks and herds with fish. The celebrated traveller, Ibn Batuta, who visited Zafar, the most easterly city in Yemen, in the early part of the fourteenth century, says that the inhabitants of that city carried on a great trade in horses in India, and at that period fed their flocks and herds with fish, a practice which he says, he had no where else observed.

[NOTE. The preceding article has been obligingly furnished by SOLOMON LINCOLN, Esq. of Hingham, whose industry and research entitles him to our warmest thanks.]

ANATOMY AND PHYSIOLOGY

OF

FISHES.

The naturalist, by his observations on the phenomena of life, is irresistibly led to the conclusion, that a progressive advancement towards the perfect organization of man, is discoverable in the whole chain of inferior existences.

As it respects the time and order of the creation of animals, we are expressly informed, in the book of Genesis, that on the fifth day after the creation of the world, "God said, 'let the waters bring forth abundantly, the moving creatures that hath life, &c.'" Moreover, the sacred chronicle further says, that "God created great whales, and every living creature that moveth, which the waters brought forth abundantly after their kind." Man was created on the sixth — and the seventh was the first Sabbath — a day of rest.

It is therefore implied, that man, being the last in the series of organized beings, surpassed all that had preceded him in the perfection of his organs, — the elements of which were displayed in a graduated scale of animal mechanism.

There is a beautiful simplicity discoverable in the structure of purely aquatic beings, that strengthens the declaration of the sacred historian, that they were the first that were endowed with life ; — and the accurate anatomist discovers, that the machinery of *organic life*, commencing with the single heart of fishes, becomes more and more complex, as species advance towards the animal perfectability of man.*

In Ichthyology, as in all other departments of natural history, it was found necessary to establish an orderly course of examination, in order to ascertain the true characters of the almost endless varieties of animals, which inhabit the ocean and its tributary streams. It was discovered in the earliest ages, in relation to the study of ichthyolo-

* A certain literary gentleman, in a romantic work on the Deluge, supposes that in the old world, the atmospheric temperature was much greater, than in this modern affair, in which we live, and consequently terrestrial animals had such an exaltation of the passions, that they were destroyed for their crimes ; but fishes, residing in a cooler element, were so much better in their conduct, that they were exempted from the otherwise terrible destruction of the primitive world.

gy, that nature had pursued an undeviating plan, with regard to the shape of the body and the position of the limbs of all such animals as were designed to exist in water. A further discovery in connexion with this, that there was a peculiarity in the structure of the gills of fishes, fitting them for different localities, led the way towards a systematic arrangement. To Linnæus, Artedi, Shaw, and lastly, the lamented Cuvier, who improved upon their labors, modern science is indebted for our limited knowledge of this interesting pursuit.

Fishes are naturally divided into two great families, viz: the *spinous* and the *cartilaginous*. In the first division, are included all that have a skeleton of bones, resembling, in some measure, the compact frame-work of land animals. They have articulations approaching, in structure, the joints of quadrupeds, — and there is, moreover, a firmness of body, in consequence of the peculiar arrangement of the asseous textures, and the shortness of the muscles, indicating their peaceable disposition; in fine, the spinous fishes have not that organization which presupposes extraordinary speed.

On the other hand, *cartilaginous* fishes are so constructed, that they can be distorted with impunity. Their bones possess both elasticity and flexibility. Their swallows (æsophagus) as well

as digestive organs, are capable of supporting a surprising distention, without subjecting the individual to even a temporary inconvenience. In the act of gorging their food, the jaws are thrown so far apart, that with the organization of the spinous fishes, the capsular ligaments would be torn from the bones, and the blood-vessels rent from their connexion with the heart. Such, indeed, is the *gristly elasticity* of the skeleton of this second natural division, that the bones are separated as often as the stomach is called into vigorous action, and resume their places again, without injuring, or in fact, disturbing the functions of the vital organs.*

These grand divisions are analogous to the two great classes of land animals, the one of which is carnivorous, and the other is sustained by the vegetable productions of the earth. Spinous fishes may be compared, in general character, to the graminivorous quadrupeds, being timid, not universally provided with weapons of defence, and possessing, to a certain extent, social habits, and are therefore rarely found alone. But the cartilaginous, like the carnivorous animals, are exceedingly voracious; — they pursue their living ali-

* The jaws of serpents are separated in a similar manner, in swallowing food. The distortion of the Boa Constrictor, in the act of gorging, is truly horrible.

ment with untiring speed, and devour their helpless victims, when practicable, at a single mouthful.

It will be perceived, therefore, that this remarkable difference in organization, adapts these two families, to that peculiar condition of things, existing in the element in which they were designed to live.

"*Eat* or be *eaten*," is the only law known to the inhabitants of the ocean. Each individual, therefore, under the instinctive influence of that immutable ordinance, feeds luxuriously on its nearest neighbor; and, at last, from the insecurity of its home, is preyed upon in its turn.

Another law, no less important and interesting in its operation, explains that prolific attribute, which is characteristic of this race of beings. Sustained on food already animalized, its rapid assimilation soon perfects the growth; and were it not for incessant slaughter throughout the seas, the ocean could not contain its own. The putrid exhalations of the floating dead, if this eternal warfare for food were suspended, would corrupt the atmosphere of the whole globe, and all life would inevitably be sacrificed to the over-peopling of the world of waters.*

* Most fishes seem to give a preference to living food: it is only under the influence of extreme hunger, that they are

Before commencing a particular description of the fishes, peculiar to the sea-board and interior of this Commonwealth, which is the ultimate object of this essay, it may, perhaps, contribute towards the advancement of such as are desirous of understanding some of the first principles of the science of ichthyology, to make the following preliminary observations on the anatomy of this great and truly diversified tribe of animals. Avoiding all the jargon of technical language, a plain and concise description of the most prominent physical characteristics, is all that is contemplated.

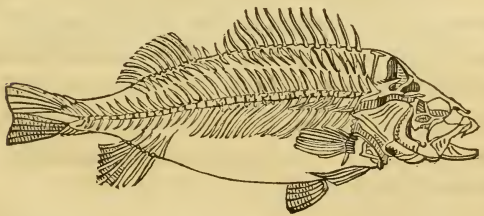
willing to feed on putrid aliment. In this respect, they resemble the frogs, toads, serpents, and indeed, several families of reptiles, that would starve, before they would voluntarily swallow animal matter in a state of decomposition — or, indeed, deprived of motion. Frogs and serpents, as far as the writer's observation extends, never dart upon insects or other reptiles, unless they first perceive that they possess some power of motion.

The toad, whose biography is given in some of the books on natural history, in consequence of the loss of one eye, was not only unable to strike the object regularly, when it darted its tongue, as in former times, but it was also deceived in the character of the object. At any rate, the poor toad became melancholy, took less exercise than formerly — and, if the above account is true, which there is no reason to doubt, — took less food too, — and being sick of the world, finally died of a broken heart! This is a fair specimen of a very clever gentleman's sympathy for the inferior animals, which was exceedingly excited by his researches in natural history.

BONES AND ARTICULATIONS.

The skulls of fishes, more particularly the portion including the brain, is the only compact part of the skeleton. Bones without number seem to penetrate the muscles, floating at one extremity like the ribs of an umbrella. Next to the head, the spine presents regularity and comparative solidity. Joints, necessarily, are numerous, but differ essentially in structure from land animals.

SKELETON OF AN OSSEUS FISH.



Although serpents have spinal articulations, so flexible that they can be tied into knots, without injury to the spinal marrow, they do not possess that freedom of motion which is so peculiar and common to joints in the back-bone of fishes. Each vertebra, entering into the composition of the spine, instead of being locked into the next, by hook-like processes of the bone, is excavated at each end. Thus, when two are brought in

contact, there will be an oval or spherical space between them, as the case may be, depending on the kind of motion required at any particular place. In this cavity is placed a strong sac, containing a gelatinous fluid; the bones move round it, like a surveyor's compass with the ball and socket joint. The sac is more or less convex, according to the necessary mobility of the section where it may be found. Near the tail, the organ of locomotion in propelling the body forward, they are nearly globular.

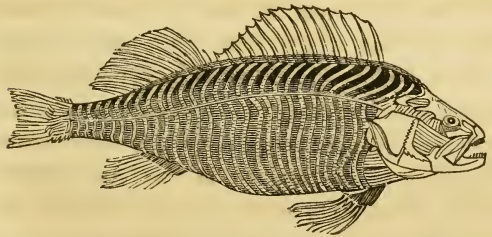
Towards the chest and head, where less motion is requisite, the sacks assume the appearance of slightly convex lenses. Being incompressible, though yielding, and remarkably, withal, confined to their places by strong elastic ligaments, both symmetry and power are beautifully and effectually combined.*

* Between the joints of the spinal column of quadrupeds, as well as man, there are pieces of what the books term *intervertebral* substance, resembling in shape a common sun-glass, but thicker in the centre. If it were not for the intervention of this elastic stuff between every two bones of the spine, which is built up of twenty-four bones, every time we take a step, the meeting of the foot with the ground would produce such a jar in the body, as to destroy the action of many vessels, and perhaps break down the brain. Constructed as it is, there is no jerk felt in the system — the weight of the body is transmitted so easily, from bone to bone, through these twenty-four cushions, that no sensation whatever is

MUSCLES.

That prodigious mass of flesh enveloping the bones, is regularly destributed in a way that is both conducive to the protection of the vital apparatus, and to the best mode of exerting muscular power. Like the cordage of a ship, every

A DISSECTION OF THE MUSCLES OF THE JAWS, AND THE FIRST TISSUE OF MUSCULAR FIBRES, UNDER THE SKIN.



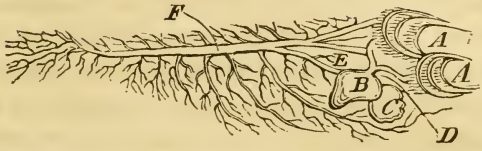
felt. The fact of this intervertebral substance being elastic, has been taken advantage of by soldiers, who have often enlisted themselves under a recruiting officer at night, when, after being on their feet all day, the weight of the body, by pressing down the intervertebral pieces, had made them shorter. Thus, the next morning, after lying in a recumbent posture, the pieces recover their former thickness, and the individual is an inch or more taller than the night before, when his height was measured. There is scarcely a person that is not an inch taller in the morning than at night, provided he has been exercising much on his feet, through the day. In old age, this substance looses its elasticity, and hence aged people become crooked and unsteady in walking. In fishes and serpents, no such change is ever effected by age.

rope has its appropriate place; but, owing to the little obliquity of their direction, the muscles act to very great disadvantage. If the bones were provided with long projecting processes, as in the bones of land animals, they would have retarded the motion of the fish through the water; it was necessary, therefore, in the economy of their natures, to sacrifice the mechanical advantage of numerous levers, that facility might be afforded to their easy movement in their destined element. Those muscles which control the fins and jaws, are short, well developed and strong in contraction: those on the sides, take a winding direction, and consequently cannot act in producing short curves. The object to be attained, in this conformation, was ample security of the viscera, with a substance that would give power to exert power.

CIRCULATION OF THE BLOOD.

A single heart, an organ containing only two cavities, instead of four, as in mammalia; circulating cold blood, which in terrestrial animals is warm, gives additional interest to the natural history of the beings under consideration; in them, the heart does not propel the vital fluid through the system, — which presents another extraordinary circumstance in their organization. The

SCHEME OF THE CIRCULATION OF THE BLOOD IN FISHES



A A. The gills, the fringes of which are the extreme terminations of arteries.

B. The ventricle of the heart, or forcing pump, which drives the blood into a single artery, that soon divides into two principal branches, carrying the blood equally to the gills, on each side of the head.

C. The oracle of the heart, or receiving organ, into which the veins empty the blood which has been the round of circulation. This contracts, and throws its contents into the ventricle, and that, again, forces it onward into the gills.

D. The main artery of the heart, or branchial artery, analogous to the pulmonary artery of breathing animals.

E. Refers to the branchial veins, which carry the blood that has been exposed to the action of the water, in the gills, back into the body, and pours it into the great tube lying under the back-bone.

F. This is the vessel into which all the renewed blood is emptied — which is an artery, acting like the left side of the heart in warm blooded animals; when it contracts, or pulsates, it throws its contents through all the small vessels that branch from it, into and over every portion of the body.

heart exerts its muscular force in throwing grumous blood, which has been the round of circulation, to the gills, and no further. From these, it

is collected by numerous vessels, which ultimately unite in one single artery, coursing its way down the body, under the protection of the vertebral column. This, unlike the vascular apparatus of any species of warm-blooded creatures, takes upon itself the action of a heart, — propelling the blood, by successive pulsations, to the remotest parts of the body.

It is almost unnecessary to remark, that animals breathing air, have a *double heart;* indeed man, and not only man, but all animals that breathe atmospheric air, have two hearts, but for the sake of *economising the room* — for the purpose of packing the parts to the best advantage, the *two* are united; — hence they occupy less space than would otherwise be the case, were they placed at different parts of the body. One heart throws all the blood, which has once been the round of circulation, into the lungs; — here its office ceases. The blood is collected from the lungs, where the first heart left it, and gradually poured into the other, or left heart, which forces the blood through every artery in the body. Both hearts are forcing pumps, and both have valves. The much admired invention of the ship-pump, with three valves, is only an imitation, and a poor one too, of the semilunar valves of the pulmonary artery. Reptiles and fishes, having only one heart, the

heart of the gills, which is equivalent to the heart of the lungs, in mammalia, are *cold-blooded animals*. On the contrary, those having two hearts, are warm-blooded animals. A whale has *no gills*, but *lungs*, and consequently breathes air, — and therefore, necessarily has a double heart. Since it has lungs, and a double heart, it also necessarily, has warm blood; and therefore, a whale, as Dr Mitchell rightly declared, is not a fish. And why? because the fish is without lungs, has but a single heart, and cannot breathe air alone, or water alone, but a mixture of both.

GILLS.

In the economy of fishes, the gills fulfill the office of lungs; — they are so constructed, that there is a free exposure, in their fringes, of the impure venous blood, to the direct action of the water.

Deprive the water of its air, by an air-pump, and it will no longer sustain aquatic life. The simple act of soaking the fimbriæ of the gills, in this fluid, is not sufficient; it is necessary to have the water forcibly driven through them by an action of the jaws.

If the operculum, or gill cover, be confined and closed with a ligature, suffocation takes place im-

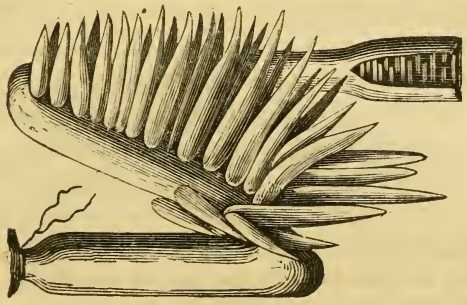
mediately. On the other hand, if the gills are forcibly kept open, so that no reaction can be effected upon the column of water on which the mouth is exerting a pressure, death will also ensue.

Most of the lizards possess lungs, which are long cylinders, extending through the whole extent of the body, but if their mouths be propped open, they will assuredly die for want of air, in a little time, as they necessarily breathe through their nostrils. The frog respires precisely in the same way — drawing the mouth full of air, and when the pouch under the lower jaw is thrust out with it, the reptile forces it into its lungs, through a slit at the root of the tongue, which is the glottis. Thus, the mouth of the frog, toad, and all the lizards, is a bellows, to force the air into the lungs. Breathing with them, is an act of volition. This explanation will account to the young reader, for the broad, flat heads of this class of reptiles; — in this respect, there is a curious analogy between them and the action of the jaws of fishes. The one is a forcing pump, as in the fish, for forcing the water suddenly through the fringes of the gills, — and the other, a bellows for driving the atmospheric air into the long slender lungs. The muscular force of the sides and abdomen, soon presses it out again.

DIGESTIVE APPARATUS.

No contrivance could be more simple, and at the same time more complete, than their digestive apparatus ; the stomach varies in anatomical structure, according to the nature of the substances on which the species are to subsist. Possessing but

STOMACH OF THE SALMON.



slight muscularity, the gastric juice, which is secreted in rapid abundance, soon dissolves the bones and tissues of smaller animals, and converts them into that condition, which fits them for being assimilated to a living system.*

* Instances are without number, which might be cited, illustrative of the active power of the gastric fluid of fishes. Very recently, a master of a vessel informed the writer, that he caught a shark, which the day before had bitten one of his men in two, who was bathing, along-side, — but there was nothing remaining in the stomach, but the tibia, some of the bones of one foot, and the metallic eyes of some buttons.

AIR BLADDER.

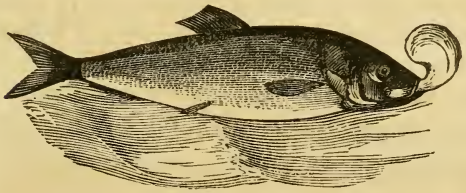
Only such fishes as swim with facility, rising and falling, as circumstances require, possess this curious and extraordinary organ. Flounders, and indeed all the flat fish, together with many of the eels, are without it; — therefore, as scavengers of the ocean, they generally remain at the bottom. In common parlance, this air sac is called the *sound*.

These diagrams are representations of the different forms which the sound or swimming bladders have, in different families of fishes. The short threads at the extremities, are air ducts which communicate with some organ that is supposed to secrete the air, and through them it passes into the sac.

In domestic economy, sounds become an article of merchandise, — being sold in barrels, for food. The physiology of this apparently simple bladder of air, is not well understood. The fish undoubtedly secretes the air in it, and has, also, the power of allowing it to be diminished or increased in quantity, unless taken by surprise.

There are circumstances, in which fishes are buoyed to the surface, in spite of their utmost exertions, by the rarifaction of the air within the sound. On George's Bank, the fishermen not unfrequently take a cod, that comes to the top of the water with a heavy lead, before it is possible to coil the line, owing to the protrusion and buoyancy of the bladder, through the mouth.

PROTRUSION OF THE AIR BLADDER THROUGH THE MOUTH.



During exceedingly warm weather, fishes in shoal water sometimes die from the bursting of the sound, or by the air forcing it through the mouth. If they were, on the approach of this trouble, to plunge into colder water, the air would be suddenly condensed, and they would escape; but, unfortunately, they are apt to loiter in shoal coves, for the worms and insects which the heat of the sun brings into activity. Thus, in turn, they become food for the very animals for which they were searching.

TEETH.

Whilst some species of fish are distinguished for the number and peculiarity of their teeth, others are as remarkable for having none at all. In those in which they are developed, they are characterized by being usually small, in proportion to the bulk of the animal, sharp pointed, and calculated for retaining a hold of prey, — the articulation of the jaws admitting of no side-way motion, as in mastication. When teeth are found on the margin of the jaws, they generally may be detected also in the fauces and throat, quite down into the gullet. Sharks are without rivals, as it respects the number and office of their teeth. Many of them have six and seven rows, spear-pointed, with cutting edges, like lancets, hooking inward towards the throat. Each tooth has its muscles for erecting or depressing it. There is nothing analogous to this, in the whole range of natural history. Their mouths are only humbly imitated in common mouse-traps ; — the admission is easy, but an exit is literally impossible.

Fishes that feed on shell-fish, as clams, oysters, crabs, &c., have no teeth in the gums, as they would be soon broken in seizing such hard substances. But beyond, the palate and throat are thickly studded with large bony knobs, resembling the double teeth of man, beautifully

enamelled, with which the hardest covering of such marine animals as they are able to get within their grip, are readily crushed.

We have various specimens in our cabinet, of this crushing apparatus, which are as difficult to describe as they would be to represent in drawings. The entire roof of the mouth, in some of the heads which came from South America, is as hard as the enamel of a molar tooth, yet so rough, as to hold the morsel from sliding, till ground into a proper condition by the opposing jaw, which has no tongue connected with it.

EXTERNAL COVERINGS.

The scales, which constitute the coverings of most of the edible fish, it has been thought, first suggested the idea of tiling or shingling edifices. Scales, in the Levitical law, were the evidences of a clean, or in other words, of an edible fish. The direct influence of that conservatory regulation, in relation to this kind of food, is observable in the markets of all christian countries. Such as have smooth skins, exude an oily secretion, that facilitates their movements, almost without friction. The first class inhabit the neighborhood of rocky shores, and require a coat of mail to prevent lacerations of their bodies ; the second, burrow in filth, and steal unexpectedly upon their unsuspecting prey.

MOTION AND USE OF FINS.

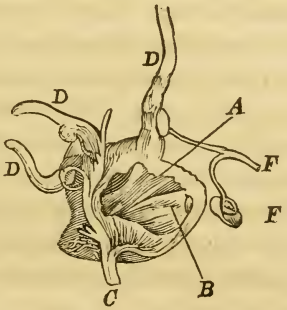
By these appendages, equivalent to arms and feet, the fish performs a variety of motions. The propelling instrument, the exclusive organ of powerful movements, is the candal fluke or tail-fin, which operates on the water precisely like a single oar, in sculling a boat. Those on the sides are only serviceable in balancing, wheeling round, and in making a sudden stop. That upon the back sustains a very interesting office, being, in fact, a *keel*, which, on boats, is placed on the under side. Had the keel of a fish been on the abdomen, instead of the back, it would have destroyed its ability for feeding on the bottom; moreover, there would have been great danger of *grounding* in shoal water. Nature, contemplating these objections, wisely placed this important appendage, by which the body is kept upright, on the back, out of the way, as well as out of danger.*

* It would be worth the while to ascertain whether Dr Bushnell, the inventor and only successful navigator of the sub-marine boat, which was constructed for attaching kegs of powder to the bottom of British ships, during the Revolution, had the keel on the upper side. As his first object was to sink under water, there would be circumstances in which the under-side keel would fasten the boat in the mud, particularly if he were scudding before a whale, who threatened to swallow the whole concern, if he did not succeed in reaching a place too shoal for the pursuing enemy.

ORGANS OF SENSE.

Hearing and seeing are probably the most perfectly developed of their senses. The machinery of the internal ear is tolerably well understood, it being satisfactorily ascertained that fishes are only susceptible of simple sounds.*

A DISSECTION OF THE EAR OF A HADDOCK, WHICH BEARS A STRONG RESEMBLANCE TO THE LABYRINTH OF THE HUMAN EAR.



A. The sacculus vestibuli.

B. The bony concretion which lies within, and which, by its vibration, increases the impulse on the acoustic nerve.

C. The auditory nerve, passing to be distributed on the sacculus vestibuli, and the extremities of the semicircular canals.

D D D. The semicircular canals, three in number, arranged very much as they are in quadrupeds.

E. One of the extremities of the semicircular canals, in which a twig of the auditory nerve is seen to be expanded.

F. This is a smaller portion of the same nerve.

* Fishes have no external ear, nor is there any visible opening, except in the skate. But there have been so many

The eye, though widely different from the land-seeing organ, is readily explained, in all its relations, by the familiar principles of optics.

In the first place, the fish's eye is nearly globular and the cornea flat; in terrestrial animals, on the other hand, the cornea is a segment of a small sphere applied to the side of a larger one, which gives the possessor the manifest advantage of having the eye extended further into the field of vision; — it is also kept convex by the aqueous humor. Now in the fish, it requires no aqueous fluid within the eye, because the element in which it swims is an equivalent. We are supposing that the reader is perfectly acquainted with the laws of refraction and reflection of light, but if he is not, he cannot understand why the lens is placed so far forward in the fish, towards the pupil, nor why the cornea is necessarily nearly flat.

quarrels between anatomists on the subject, that all the skates in the ocean would not pay for the paper, which has been wasted about a certain little hole in their head, therefore we shall be careful about getting into the ring. Fishes have just so much acoustic apparatus as constitutes the central portion of the ear in man, viz: the vestibule and semi-circular canals, but the whole is boxed up in the solid bones of the skull, so that sound, propagated through the water, gives a vibratory motion or tremor to the whole body, and which, agitating the auditory nerve, produces the sensation of hearing. Fishes can easily be taught to feed, in ponds, by the ringing of a bell.

The water in which the fish lives will always keep the outer tunics moist, — consequently, nature has not lost labor by bestowing a lachrymal sac ; — no tears are required for lubrication.

Not being designed for facial expression, the oblique muscles are merely cords in embryo, as it were, showing the chain which establishes a relationship between all races of animals. The pigmentum nigrum covers only a portion of the pasterior surface of the retina, — enabling them to see in the day, but the metallic lustre of the remaining surface, becomes a concave mirror in the night, which gives them vision, as distinct, probably, as at noon day. Some fishes are only taken by a hook in the night : those are the owls, that cannot see by day. Others, the voracious kinds, dart at all times, both night and day, at the bait, with precision. Sharks follow vessels, hundreds of miles, and never fail to catch every bone which is thrown overboard, at all times.

But there is another contrivance in the constitution of the fish's eye, very wonderful, inasmuch as it shows most convincingly, a provision against the pressure of the incumbent column of water. Thus, in the voracious species, principally the sharks, the sclerotic, or outside coat, is perfectly hard bone, except on the back, where there is an opening for the entrance of the optic nerve. In

pursuing their prey, at unfathomable depths, for aught we know, the hydrostatic pressure would crush in the whole globe were it of membranous tunics, like the land-seeing eye; but being of bone, it resists the pressure, and thus saves the organ. Shoal water fishes, possessing the membranous eye, if forced down to a certain depth, would be made blind, and come to the surface with the entire loss of the internal humors. A pretty accurate judgment may be formed of the depth to which any species of fish swim, by an examination of the coats of the eye, as in one case there are ribs of bone, as in bird's and turtle's eyes, and in others, flat pieces are inserted, merely to offer firmer resistance to the pressure of the water, which is greater there, than on the body.

There are no eye-lids, because it is necessary to see, even while they sleep. Fishes undoubtedly sleep, — but necessarily with open and vigilant eyes.

There are no eyelids, because they would have been entirely useless, it being necessary for fishes to *perceive*, even while they sleep. It has been said to us that the vitreous, and other humors resist the external pressure, and therefore our hypothesis in regard to the object of an osseous sclerotica, is quite objectionable. If it were true, that the vitreous humor, and crystalline lens, were

of equal density, the internal resistance would be in proportion to weight placed over it; but as they do not correspond, in that respect, they would be liable to the injuries and destruction, from the cause that has been mentioned.

Over the eye, the first investing membrane, the *conjunctiva* of the human eye, is loose, and wrinkled in fishes brought up from deep water, but smooth and glossy on those at medium depths. Does this not look like compressing the fluids into smaller space? It is certain that some aquatic eyes cannot, by the nature of globular tunics, be condensed, without rupturing them. But it is needless to dwell on a subject, which, perhaps, is already familiar to our readers.

As it respects the power of vision under water, we can only infer the principle, by our knowledge of the laws of optics. That fishes see at great distances, is well established, but a turbid condition of the water, renders vision indistinct, and hence they are often deceived, and involved in fearful difficulties. In clear, calm weather, they probably are able to discover objects much farther than would at first be supposed, considering the medium through which the light is transmitted. The whale examines a boat one or two miles off, distinctly, and if enraged by the sting of a harpoon, runs or swims with prodigious speed towards the object that has excited its revenge.

When fishes are out of water, they see indistinctly, as a man descerns things with his head submersed. Pearl divers, on the coast of Brazil, see objects precisely as an aged person does through concave glasses. It has been ascertained that there is an advantage in furnishing the divers with spectacles, whose convexity, on both sides, is just equal to the convexity of their own corneas. The reason is plain :—without them they cannot judge accurately of distances. In reaching out the hand for an oyster, which appears within reach, it may, perhaps, be at the distance of ten feet; hence there is a loss of time, requiring the Indian to come up for breath, and plunge again, to correct the deception of vision. The rationale of this error of vision, is simply this: viz, the aqueous humor of the diver's eye, is of the same density of the water that covers him, therefore, there is no refraction of the rays of light, or at least, only a very little, in passing from the water, to the retina, but the convex artificial lenses, remedy the defect, most perfectly.

When the fish is brought into the air, the eye not being defended either by eyelids, brushes of hair, or, indeed, by anything more than the conjunctiva, which is nothing more than a continuation of the common skin of the head, carried over the globe, the first glare of light partially paralyses

the optic nerve; but the organ begins at once to accommodate itself, in some degree, to the exigency of the case: the pupil diminishes its diameter a trifle, but the fish then sees precisely, as we see under water; in reality, it is near-sighted. Having no aqueous humor, the refraction produces the utmost confusion for the moment. We have noticed, that in putting a fish back into the water, after having been in the air a few seconds, the vision is very considerably deranged; it swims against whatever may be in the line of its direction: indeed, there does not appear to be any determinate purpose; but as soon as the visual organs have re-accommodated themselves again to the water, and the optic axes are restored from the distortion which they received in the atmosphere, the fortunate refugee appears again as it did before the capture.

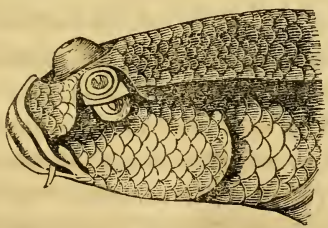
Before leaving this subject, we cannot refrain from making some observations on the structure of the eyes of the *Anableps Tetrophthalmus*, a scaly fish, from four to ten inches in length, found at Surinam, and, we believe, no where else. By the politeness of Captain James Crosby, of Boston, and the American Consul, at Surinam, we have been provided with several specimens, in a fine state of preservation. As it respects the habits of the anableps, we are not informed, but the

structure of its eyes is such a remarkable deviation from every other living creature, that we hope to be pardoned for the prolixity of these remarks.

In the first place, the cornea presents an acute horizontal angle, along its middle, — and on each side, sloping off at angles of forty-five degrees, the corneas, for in reality there are two of them, are flat surfaces, in our specimens, though probably slightly convexed in life. Thus, it will be understood, that two sides of a common prism, represents them. On a careful dissection we have ascertained that the sclerotica is a cartilaginous box, nearly globular, rolling within a bony orbit, which is entirely elevated above the plane of the cranium. The partition between the two corneas, is membranous, and like the blade of a knife, the further edge being attached to the capsule of the crystalline lens. The iris, therefore, is divided in the middle, so that the pupil resembles a half moon, either side, or in other words, above and below the horizontal partition. On minute inspection, we cannot discover any difference of shape or structure in the lens, from the same refracting instrument in the eyes of other fishes. Certain it is, that the anableps can perceive objects from above and below, — embracing half a circle in the sphere of distinct vision, and that is the only advantage, at first view, we can imagine they derive from the organization of the

prismatic cornea. On the other hand, the whole globe is so raised upon the top of the head, that without this structure, they would, perhaps, only distinguish objects that were on a level with the base of the orbit; a defect, admitting such to be the fact, completely obviated, by giving the cornea an acute angle across its horizontal centre — allowing the rays of light, from the angle subtended by the planes of the two corneas, to reach the retina from two directions, nearly perpendicular to the horizon. Some have imagined that the one pupil was long-sighted, for distant views, and the other short-sighted, for minute objects.

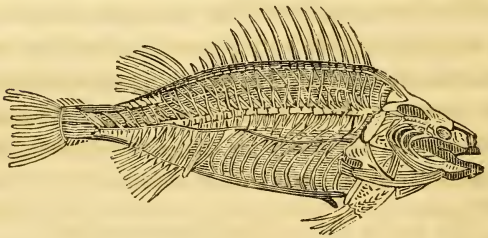
THE EYE OF THE ANABLEPS TETROPHTHALMUS.



Fishes are acutely sensible of touch; — the sense of smelling, for which appropriate nerves are elaborately distributed, gives them the faculty of detecting the existence of food, or enemies, at immense distances. Taste is undoubtedly the weakest of their senses, — residing, if at all, in

the æsophagus, as everything presented to them, under circumstances of hunger, is swallowed with ravenous avidity, without regard to quality or flavor.

SCHEME OF THE DISTRIBUTION OF THE VERTEBRAL NERVES OF THE FISH, FOLLOWING THE COURSES OF THE FLOATING OR CILIARY BONES.



AGE TO WHICH THEY LIVE.

Perhaps there is no subject on which the naturalist has labored with less success, than in trying to ascertain the age to which fishes attain. Admitting that an individual of any species were undisturbed by enemies, or unmolested by its own kindred, and quietly enjoying a circumscribed body of water, amply supplied with appropriate food, there is no reason for doubting that it would live for many centuries. We know of no limits to their longevity, nor can we suppose that the internal machinery would wear itself out, so long as the digestive organs were properly excited.

But the time must ultimately arrive when death will terminate their existence; though admirably constructed for an uncommonly long life, they are not, nor can they be exempted from the operation of a law, which to intelligent beings, is contemplated with the deepest feelings of awe and solemnity.

Pike and carp, in artificial ponds, have been repeatedly found, with gold rings in their fins, and other kinds of labels, on which were also found dates, that proved, conclusively, that one hundred years had elapsed since the inscription was made.

Gesner speaks of a pike that was known to be 267 years old. It is affirmed by some of the French writers, that several pike are in a pond, which formerly belonged to the Duke of Orleans, father of the present king, so very aged, that their original complexion is completely lost: they have become of a dingy hue, and actually give the spectator the idea of extreme old age.

Cartilaginous fishes have a still greater prospect of living to an advanced period. Instead of bones, as previously remarked, their skeletons are elastic, having but a small portion of earthy matter in them. As the vessels secrete but little ossific matter, they do not become rigid, as in the land animal: — the heart is in no danger of being converted into bone, — indeed, we do not know why many of them

might not live and continue to grow for a thousand years.

It was at one time thought that the circles discoverable on the ends of the vertebræ of the osseous tribes, indicated the age, — as the rings on the extremity of a log, marked the years of the growth of the tree. Those, unfortunately, are no guides, — and we therefore regret that we know of no mode, at the present day, of solving a problem of the highest interest to the curious. Of the marine fishes, the sharks unquestionably, reach a truly patriarchal age.

SLEEP.

Exposed as these animals must necessarily be, to the voracious jaws of millions of belligerent, as well as hungry associates, — it would seem hardly possible that they should find a safe opportunity for this kind of rest, however much they might at any period require it. Again, being without eye-lids, they would be regarded, at first thought, as organized to require no suspension of the powers of volition. Impossible as it is to speak with certainty on this point, we are fully persuaded that they not only require sleep, but that they also find safe and convenient times to enjoy that sort of repose. Gold fishes, in vases, repose, regularly through the night,

after the lights have been extinguished. This is inferred from their remaining precisely in one position, six and eight hours at a time.

PROCREATION.

Fishes are astonishingly prolific: — a majority are oviperous, and some of the condropterygii are viviperous. This latter class, however, are less numerous than the first. It has been often asserted by credible writers, that the cod produces nine million of eggs in a season; — the common flounder a million, and the mackerel, above five hundred thousand. On the other hand, the cartilaginous varieties seldom give birth to more than a few hundreds of living young at a time. If only one in the three hundred arrives at maturity, its power will ensure the continuance of the race, but with the social and andromous, scarcely ten eggs in a thousand are ever developed, — being the necessary aliment of others, — but the continuance of the species is thus insured against all probable contingencies.

Each egg is filled with a yolk, surrounded by albumen, like that of the serpent, the crocodile, and the bird. They are commonly extruded in shallow water, out of the reach of eddies, where by the glutinous envelope in which the mass is held to-

gether, they get fastened to some stick or stone, which retains them in a favorable condition for the influence of solar heat. By what combination of circumstances the male is apprised of the desire which the female has for expelling her burden, cannot be explained: but it is nevertheless true, that they commonly accompany her, and no sooner are the ova deposited, than he swims over them to complete the process. There is no acquaintance between the parents: the male, in coming in contact with the spawn, is excited by the presence of the appropriate stimulus of the genital organs, and a fluid is emitted over them, which, though greatly diluted in water into which it is infused, exerts a specific action on the egg, which immediately begins to quicken into life.

It may so happen, however, that the male of another species accidentally in his wanderings, comes in the region of roes — which excite him to expregnate them, just as readily, as the presence and contact of those of the family to which he belongs. The excitation effected by the eggs, cannot be withstood, — for there are no moral restraints in the regions below, and physical necessity, absolutely, in this instance, forces into being, a race partaking of the habits and characteristics of the two progenitors.

Sir Humphrey Davy says, "it is a fertile and a

very curious subject for new experiments, — that of crossing the breeds of fishes, and offers a very interesting and untouched field of investigation, which I hope will soon be taken up by some enlightened country gentleman, who in this way might make not only curious, but useful discoveries."

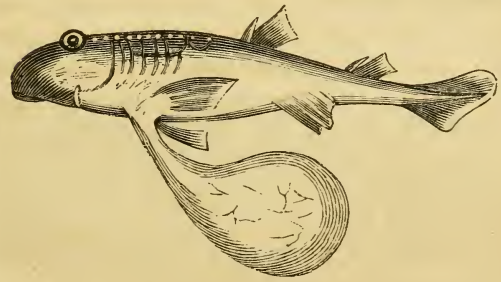
We have stated the fact that the ova are impregnated out of the body of the mother, and it may appear somewhat surprising that the mere pouring of the seminal fluid from the milt of the dead male, is equally successful. The vitality of fishes is of an order so low, that the temperature of the air or of the water, is generally equal to the heat of their blood, — hence no vital property is lost, even in the dead fish, if the experiment is performed before the commencement of putrefaction.

Jacobi, a German experimentalist, on the increase of trout, and salmon, has satisfactorily settled the question, that this operation can be done very readily. That gentleman raised his own trout, from the egg, which he accomplished in the following manner. He had a box, with a wire grating at one end, for admitting the water, freely, from a lively stream — and holes, at the other end for the same water to pass out: thus there was a running course over small pebbles, placed on the bottom. In November and December, when the

trout were nearly in a condition for spawning, he caught both males and females in a net. By gentle pressure of the hands, the ova were received into a vessel of water. He then, by similar contrivance, forced the seminal liquor of the male into the vessel, and after the two had been in this condition only a few minutes, he placed the eggs in his hatching box, to wait the result. At the expiration of a few weeks, the parchment-like shells burst — and to his unspeakable delight, the box was swarming with an immense school of infant trout. To each individual, was appended a little sac, which contained the yolk. This was their food for a considerable time — being gradually taken into the stomach, by the absorbing function of the naval string. Here is a very striking analogy to the provision, which is made for the young of birds. The yolk does not in any way become organized in the process of incubation: — it was expressly designed for the first food of the newly created animal. Surely, this is an illustration of the homely saying, "that there is never a mouth without something to put into it." When the chick is hatched, the yolk is still as perfect, as before, but instead of being in the old shell, it is now within the body. Enclosed in a slightly elastic capsule, there is a duct leading from it, that terminates in the stomach. Through this, it continues flowing, as

fast as the necessities of the system require it, — till the whole is ultimately exhausted. When this is finished, the pipe becomes a binding ligament of the viscera, and the little tottling biped, is ready to pick up something with its bill.

A YOUNG SHARK CARRYING THE YOLK OF THE EGG FROM WHICH IT WAS HATCHED, SUSPENDED BY THE UMBILICAL CORD, IN A SAC.



Farmers, from their ignorance of the wonderful provision by Divine Providence, for all oviperous animals, destroy a vast deal of young poultry, in their mistaken humanity in trying to make them feed too soon. Let them alone, and they will give seasonable indications of their simple wants.

From the box, Jacobi transported his stock, and founded new colonies wherever he chose. Bloch relates, as the result of an experiment, in speaking of the reproductive power of the carp, that in a pond of seven acres, in which were placed four

males and three females, the increase was 110,000 young carp.

Interesting as this inquiry must be to the physiologist, we regret the necessity for bringing it to a close; this we are unwilling to do, without expressing an earnest hope, that these observations will induce others, more competent than ourselves, to pursue an investigation, fraught with such a high degree of interest.

GROWTH.

Probably the spinous fishes complete their growth much sooner than terrestrial animals which, at an adult age, arrive to about the same weight. On the other hand, the cartilaginous, as well as some varieties of the flat ones, continue to increase in size, under favorable circumstances, many years. The skate, which in this northern latitude, does not often exceed five feet in breadth, in the West Indies, has been known to attain the enormous size of twenty-five feet in length, by fourteen in breadth.

The rapid growth of some fish is very extraordinary. Three pike were taken out of a pond in Straffordshire, belonging to the present Sir Jervoise Clark Jervoise, two of which weighed thirtysix pounds each, and the other thirtyfive pounds.

The pond was fished every seven years, and supposing that store pike of six or seven pound weight were left in it, the growth of the pike in question must have been at the rate of at least four pounds a year. Salmon, however, grow much faster. It is now ascertained that grilse, or young salmon, of from two and a half, to three pounds weight, which are sent to London markets in the month of May, come from spawn only deposited in the preceding October or November, and the ova takes three months of the time to quicken. It has also been ascertained by experiment, that a grilse which weighed six pounds in February, after spawning, has, on its return from the sea in September, weighed thirteen pounds; and a salmon fry of April, will in June weigh four pounds, and in August, six pounds.

BRAIN BONES.

Contiguous to the lobes of the brain, naturalists have discovered two peculiar bones, in common parlance, called *brain bones*. They are enamelled, like the finest tooth; convexed on one side, concave on the other, and serrated at the edges. By cooks, these bones are termed the *fish money*. By boiling, they are easily detached. In looking into the cavity in which they are lodged, it is evident that the fibres of the acoustic nerve ran

through it: a gelatinous fluid, glairy, of a similar character to the white of an egg, seems both to suspend the bone, and also afford a proper bed for defending the nerves. Though comparative anatomists are not precisely satisfied as to the office they sustain, it is pretty generally conceded that they are a part of the organ of hearing. If, however, our readers will examine the diagram we have given of the labyrinth of the fish's ear, which corresponds very nearly with the vestibule and semicircular canals of the human ear, he will perceive that the brain bones are entirely unnecessary to the perfection of the organ. Their use is not understood.*

*Since the compositor completed the preceding pages, in which it is remarked that fishes are without eye-lids, a specimen has come to hand, of a small fish, seven inches in length, from Africa, the mounting of whose eyes on the top of the head, bears some resemblance to the anableps, covered by a regular pair of eye-lids. This must be regarded as belonging to an unknown genus. In a small shark, too, we have detected the nictitating membrane, organized much as it is in the owl, and other night-seeing birds.

CLASSIFICATION.

ARISTOTLE is supposed to have been the first naturalist who regarded fishes as a distinct class of animals, though he seems not to have understood their very peculiar organization. Pliny was the next writer of antiquity who devoted much attention to them, though from the earliest ages of the world, they were an important article of food, as much as at the present day.

Without detailing the classifications of a series of distinguished writers, those of Linnæus and Cuvier are now generally adopted. Had that great and good man, Cuvier, been permitted to live a few more years, he would probably have completed that splendid work on fishes, which occupied many years of his industrious life — and which, on a dying bed, he spoke of leaving in an unfinished condition, with the deepest interest and regret.

Linnæus divided these animals into five orders :

1. APODAL, — with bony gills, and no ventral fins.
2. JUGULAR, — with bony gills, and ventral fins before the pectoral.
3. THORACIC, — with bony gills, and ventral fins under the throat.

4. Abdominal, — with bony gills, and ventral fins behind the thorax.

5. Branchiostagous, — with gills destitute of bony rays or concealed gills.

6. Chondropterygious, — with cartilaginous gills, and leathery fins, the common skin being continued over them.

Cuvier found there was a great deal of difficulty and vexation, when an attempt was made to divide them into orders, "established on fixed and precise characters; but the two great divisions, founded on the character of their bones, as being cartilaginous or osseous, are natural and well marked. The first series, or *chondropterygii*, have, as a general character, the palatine bones arranged so as to supply the place of those of the upper jaws." He therefore divided them into three orders.

CHONDROPTERYGII.

1. Cyclostomi, — The jaws fixed in an immovable ring, but the branchial openings numerous.

2. Selachii, — with branchiæ as in the preceding, but not their jaws.

3. Sturiones, — branchiæ opening as usual, in a cleft, protected by an operculum, or gill cover.

OSSEOUS.

4. Plectognathi, — maxillary bone, and palatine arch, fixed to the cranium.

5. Lophobranchii, — with complete jaws, but having the branchiæ in small tufts.

6. Malacopterygii Abdominales, — ventral fins on the hinder part of the abdomen.

7. Malacopterygii Subrachiati, — ventral fins under the pectoral, on the throat.

8. Malacopterygii Apodes, — destitute entirely of fins.

9. Acanthopterygii, — first dorsal fin, or the first portion of both, where there are two, having spinous rays.

This last order, Acanthopterygii, is divided into seven families:—

1. *Tænioides*, — as Mediterranean Band-fish — having a short snout.

2. *Gobioides*, — without a swimming bladder, and having slender flexible dorsal spines, as the brenny.

3. *Labroides*, — a single dorsal fin, as the Wrasse, of European seas.

4. *Percoides*, — having the dorsal and anal fin supported before, by strong, sharp spines, as the sculpin and perch.

5. *Scomberoides*, — having small scales, as the mackerel.

6. *Squamipennæ*, — scales encrusting the soft part of the dorsal and anal fins, as the *Chætodon*.

7. *Fistularidæ*, — the mouth at the extremity of a long tube, which is a prolongation of the ethmoid, and other bones of the head, as the *pipe fish*.

CLASS I.

CARTILAGINOUS FISHES.

ORDER I.—CYCLOSTOMI.

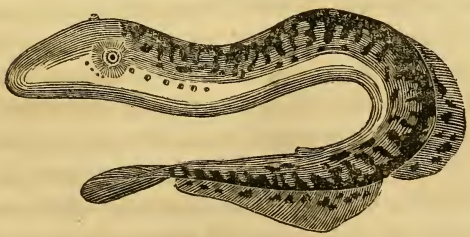
GEN. PETROMYZON.

Sea Lamprey. — *Petromyzon Marinus.* Like the eel family, in general, the lamprey has a long, flexible, slender body, covered with an oily excretion, admirably fitting it to slide into dark, and oftentimes difficult hiding places. It is unsocial in its habits, — timid in the day-time, but voracious, courageous and unyielding in the night, when it ventures from its lurking place, in search of food. The size to which they grow in the arms of the sea, in the limits of Massachusetts, particularly, is not great, nor are they commonly more than two feet in length. As the traveller, however, follows the southern shore, he not only finds the sea lamprey much thicker, but also much longer. Three feet may be considered an average length in the southern states, but the saltness of the water and its coldness, so far to the north, is unfavorable to their multiplication, as well as magni-

tude. To the eastward, at the mouths of some of the rivers, in Maine, the *marinus*, even when fully grown, does not exceed seventeen and twenty inches.

This fish may be designated, with certainty, by its marbled, brownish skin, — possessing a silvery shade towards the underside of the abdomen, — and one dorsal fin, distinct from the second. In the top of what authors call the maxillary ring, there are two large teeth. Though there may be variations in color and size, in following the coast, it may be distinguished by the other marks which have been detailed. Within the inner side of the jaws, and commencement of the fauces, are twenty rows of fine teeth, and seven breathing holes on the side of the neck.

SALT WATER LAMPREY.



All the lamprey's movements, strikingly resemble those of the serpent, nor does their muscular apparatus differ essentially from it.

The manner in which the gills are arranged, under the skin, is a subject of deep interest to the anatomist, inasmuch as he discovers at once, a structure of the utmost consequence to the species, since they were expressly designed by nature to occupy a place where no other beings were located, viz: — the muddy beds of bays, — the ooze which accumulates in estuaries, and in fact, just those places where fishes could not live on account of the foreign matter in the water, which would clog up their gills, and consequently produce death.

Between the side of the mouth and the skin, there is a long canal, or pocket, in which the branchiæ, or fringes of the gills are placed in a row. Opposite the space or little apartment, between every two fringes, there is a round hole, tipped with a cartilaginous ring, precisely like a hoop, to keep it always open. When the lamprey is snugly coiled up in a bed of loose, dark mud, where it finds a variety of marine worms, putrid remains of various animals, &c., forced into such basins by the eddying tides, it strains the water through a very small aperture, into which it forms its mouth, till the under side, or gular pouch is considerably distended, when by the action of the muscles about the jaws, it is driven through all the fringes, and comes out at the orifices. By this beautiful, yet simple

contrivance, no mud can get into the fringes, — or if it does into the side holes, the next exertion of the jaws, throws a stream of water to wash it out again. So far as the gular pouch is concerned, in the respiratory function, the lamprey bears considerable analogy to the lizards. Breathing, with those reptiles, is an entirely voluntary act: — the mouth is drawn full of air, through the nostrils, and then, the under jaw being in action like a bellows, forces it into the lungs.

As an article of food, they have been much prized, but as we do not see them very frequently in the stalls, it is conjectured they are scarce, or there are not purchasers enough to compensate for the trouble of collecting them.

FRESH WATER LAMPREY.

Fresh Water Lamprey. — *Petromyzon Fluviatilis.* There is scarcely a portion of New England, even in the most elevated regions, in which the river lamprey may not be found. The etymology of the name *petromyzon,* is found in two Greek words, signifying *to suck a stone.*

Usually, its color is a dark olive on the back,

but with a light yellowish tinge on the abdomen. The first dorsal fin, like that of the sea lamprey, is separated from the second. To all intents and purposes, it is the same fish, — having the characteristic two large teeth, only it is found in ponds and streams so remote from the ocean, that it is next to impossible that it should have had, within centuries, any intercourse with the sea, though that is the original seat of their ancestry.

Birds, in their rapid flights from one section of a country to another, have not only distributed the eggs of fishes and the seeds of plants, but even the living animals themselves. It is in this way, that we are obliged to account, for example, for the appearance of a lamprey in a small pool, hundreds of miles from the ocean, which has no communication, whatever, with running streams. The wading birds, as the heron, might swallow one of these animals, whose vitality is of so low an order, that it is not necessary for them to breathe a mouthful of water, even for many hours, — and convey it in its intestinal tube, three hundred miles, and if it were voided, where such carnivorous birds would be most disposed to rest, the fish would recover any temporary injury by the journey, — and if it were pregnant, the race would be propagated, and thus the waters of the interior of the country, become stocked by a new family of aquatic beings.

Such is the power of life, that it completely resists, for a long time, the gastric juice of the stomach. Repeated observations are on record, by credible eye-witnesses, who have seen birds of prey, swallow an eel, that escaped, unharmed, in a few minutes. Nor is this so very strange, when it is recollected that the intestine is very short and large, and that the imprisoned fish has prodigious strength, in proportion to its weight, and above all the rest, coated with a mucous, so slippery, that the grip of a strong man's hand, cannot hold one fast.

On some of the highest points of the green mountain, between Massachusetts and New York, in those small basins of water which are formed between different eminences, lobsters are not only numerous, but really and truly formed, precisely like those of the ocean, yet they rarely exceed two inches in length. The question at once arises, how came these animals in that locality, if the ova of the lobster were not conveyed there by some bird? The fresh water, together with the climate of those high regions, have prevented the full development of those miniature lobsters, though in character, habit and anatomical structure, there is the most perfect resemblance: — and were the ova from the family on the mountain, placed under favorable circumstances, in the borders of

the sea, we have no doubt that the progeny would be as large, in one or two generations, as any specimens which are exhibited from the ocean.

Occasionally, this lamprey may be seen in broad day, in a clear spot of still water, in a bend of the river, with its mouth firmly fixed to a stone — while its body gently waves in the water. The mouth, indeed, is surrounded by a ring, which they can enlarge or diminish at pleasure. When thus adhering by the lips, by suction, for hours together, they do not breathe: in order to exercise the gills, they must first let go the hold and close the jaws suddenly, to propel the volume through the lateral apertures.

The Montreal Courant says, "On Wednesday last a large sturgeon was observed to leap from the water into a canoe lying at the island in the port, opposite the foot of St. Joseph-street. Immediately means were taken to secure the fish, which, when taken, was found to have two lampreys, about seven inches in length, sticking to its body, one on the top of the head, and the other on the insertion of the large fin next the gills. There cannot be a doubt but the fish, in its agonies and efforts to get rid of the lampreys, sprung out of the water with such violence as to precipitate it into the canoe in its descent. The peculiar construction of the mouths of lampreys, show

how powerfully they can attach themselves to any substance, and seem expressly constructed to give them a powerful suction ; nor is the rapacity of these fishes less than their power of laying hold of their prey ; for when kept some time out of the water, and again placed near the sturgeon, they seized it a second time with much eagerness. The sturgeon measured three feet eight inches ; his little tormenters not a sixth part of his length, nor a sixteenth of his weight."

These are considered excellent eating, in most places, but on what account, we cannot understand, since, if possible, their external appearance is more forbidding than many other chondropterygious fishes, which are held in utter abhorrence.

Stewed lampreys, in England, was a dish once held in high estimation. King Henry I. died of a surfeit, in consequence of eating too heartily of this favorite dainty.

In the reign of Henry IV., says a writer in the Conversations Lexicon, so highly were they esteemed, " that protection was granted to such vessels as might bring them in ; and his successor issued a warrant to William of Nantes, for supplying him and his army with this article of food, wherever they might happen to march."

In severe weather, the lamprey endeavors to hide in deep places among the rocks, — but the

fishermen, by extending pits, communicating with the ocean, into which blood is thrown, entice them into the spots where they stand in readiness to capture them.

Some suppose the lamprey of Rome was of another genus, the *murenophis*.* Pliny informs us that Lucullus had fish ponds in the vicinity of Naples, of such vast extent, that after the death of the owner, the fish in them sold for 4,000,000 sesterces, — equal the sum of $170,000. One Hirrius had a pond exclusively for his lampreys, — and so ample was his stock, that on a certain occasion, when Cæsar made a grand entertainment, he furnished him with six thousand. The celebrated orator, Hortensius, owned one, which seems to have been a particular favorite, for it is said "*that he wept bitterly*," when it was dead. Antonia, the wife of Drusus, exhibited her affection for one of them, by ornamenting it with jewels, but we are not informed how they were put on. Its bite was, in those days, considered poisonous, but no such opinions are entertained in this age; or if they are, they are unfounded.

Annually, the city of Gloucester, we are told, but for what reason, we have not been able to as-

* Several writers refer to the *Gymnothorax*, which was in such estimation with the Romans. History relates the curious circumstance of a Roman lady going into mourning on account of the death of a favorite muræna.

certain, at Christmas, used to present a lamprey-eel pie to the king. Much is said by the old writers, of the Roman eel, which nearly resembled the species under consideration. Reservoirs were constructed, on a magnificent scale, by the opulent, where the lampreys were made so docile, by regular feeding, as to rise to the surface when called. Pliny relates, as a fact, that one Vedious Pollio, a particular friend of Augustus, took delight in throwing his slaves into the eel vats, for the pleasure of seeing them torn to pieces and devoured. On a particular occasion, the emperor honored Pollio with his company, at a brilliant entertainment, at which a slave unfortunately happened to break a costly crystal vase. The unfeeling master, in a paroxysm of fury, exclaimed to the other attendants, — "away with him to the murænæ." The poor wretch, all but dead with horror, fell at the feet of the emperor, beseeching that he might be permitted to die some death lest terrible! Astonished at the sudden and strange circumstance, Augustus made speedy inquiry into this extraordinary mode of punishment, and when he fully understood the savage cruelty, disposition and practice, of Pollio, ordered, at once, all the remaining vessels broken before his face: —directed the reservoirs to be filled up, — gave freedom to the pleading slave, and only consented to spare the life of the murderer, his master, in consideration of his former regard.

ORDER II.—SELACHII.

SQUALIDES.

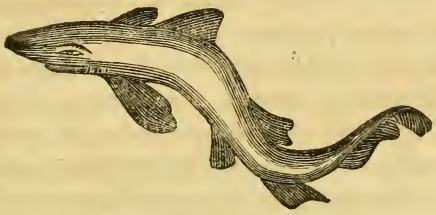
Sharks have no bones like those of the second class of fishes; they are elastic, cartilaginous portions, embraced by numerous muscles. The branchiæ are pectinated,— the openings quite numerous, without gill covers, and the palate and post-mandibulary bones are studded with teeth. They have pectoral and ventral fins,— but the last is placed backwards, on the abdomen. While some are viviparous, others are oviparous,— and all the males may be identified by appendages at the internal margin of the ventral fins. Though these are the indications of the sex, their use is totally unknown.

GEN. SCYLLIAM.

Sea-Dog,— Scyllium Canicula,— *le chein de mer*, of which we have a well preserved specimen, four feet in length. It follows the perch, when they first make their appearance in the spring, in the margin of deep water. It has a remarkable metallic color, like crude antimony. The teeth are very small, giving the sensation to the finger of a coarse rasp; its body is slender, the head flat,— the nose long and pointed:— the eyes much re-

sembling the cats, are placed low, towards the snout. Beside the above marks, it will be recognised by an anal fin, exactly opposite the space

SEA DOG.



which is between the two dorsals. When the dead body is handled, it is as flexible as a whip-lash, — tough and leathery. Though we know nothing with certainty of its habits, it probably possesses all the traits of character, peculiar to the order.

Scyllium Catulus, — a little shark, very similar to the preceding, only about eighteen inches long. Its color is that of ashes — having shades of a red tinge, when first drawn from the water, on the sides, towards the corners of the mouth. The mouth, in this, is small, and shaped much like a horse-shoe, — but so completely underside the head, further back than the eyes, that it is strange they can apply the jaws at all, to hold their prey. One of these miniature sharks, the past season, was drawn into a pleasure boat, by a gentleman

fishing for cod, that quite frightened his associates by its spiteful snappings.

Dog-Fish, — *Squalus Canis.* A manifest difference is observable between the *sea-dog* and the true *dog-fish*, the first, which has been described, more nearly resembles the blue shark, whereas, the latter, so far as it regards anatomical structure, approximates the sea-wolf,— in having a long, stiff, dorsal fin, hard, conical, irregular teeth, a rough skin, which, when dry, is used by cabinet makers for polishing wood, and by surgical instrument makers, for covering cases.

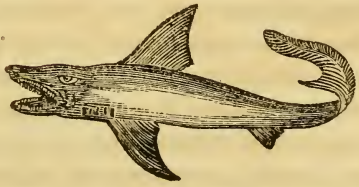
It is a spiteful, voracious, cartilaginous shark, — very muscular, and the eternal enemy of the cod, — getting possession of the feeding ground, some seasons, to the great loss of the fishermen. In 1831, they were so uncommonly numerous, that the cod-fishery was attended with immense loss. The dog-fish is so familiarly known along the entire coast of the United States, that it is quite unnecessary to be minute in the description.

GEN. CARCHARIAS.

White Shark,— *Carcharias Vulgaris.* All sharks are a solitary, rapacious, blood-thirsty species of animal, carrying slaughter and certain destruction, wherever they go. They are, as respects their own element, precisely what the Bengal

tiger is in India,— the most insidious and cruel, of all the inhabitants of the great deep. Of all others, the white shark is the most terrific, and therefore regarded by mariners with peculiar dread.

WHITE SHARK.



White sharks cannot be said to be very common on this coast; vessels, in approaching the land, occasionally discover one of these huge devourers, gently gliding through the water, in the wake of the rudder.

Usually the color is a light ash, hence its name, though it is by no means always of that shade. On the back, as with nearly all fishes, the skin is quite dark; the tail has three lobes; teeth exceedingly numerous,— and the body, when fully grown, from twenty to thirty feet long. In tropical climates, however, it attains its greatest size. Fossil teeth of a shark, to which family the one under consideration belongs, are found at Malta, measuring four and a half inches from the point to the base, and

six inches from the point to the angle. All the fossil bones of the antediluvian races, which have been discovered, show that the primitive animals were of far greater magnitude than those of the present time. Perhaps there is no subject of deeper interest to the naturalist, than this curious fact, sustained by the exhibition of entire skeletons, in the cabinets of this country and Europe. These prove, conclusively, that those which preceded the present occupants of the soil, were truly gigantic. The perfect bones of a lizard, sixty feet in length;—the teeth, skulls, and vertebræ of the mastadon, as well as some others, will ever remain objects of wonder and astonishment. Were those moving mountains of flesh, proportioned to the products of the earth? and if so, and they were permitted to roam over the globe, what physical change in the constitution of the world, rendered it necessary to drive entire species utterly from existence, by a sudden and terrible desolation? After the deluge, the animals which were distributed over the continent of Asia, seem to have been diminished in form, and though, in process of time, exceedingly numerous, the aggregate, apparently, is better proportioned to the amount of sustenance, yielded by the soil.

How these observations will apply to the water, we are not prepared to say. The whale

is probably as large as the primitive whales, but those animals which were certainly on the dry land once, corresponding in bulk and power to those in the ocean, no longer have a being.

But to return ; — the white shark, in his wide, dilatable jaws, has six rows of sharp, triangular teeth, which can be raised or depressed by appropriate muscles, at pleasure. Its velocity is such, that nothing seems to be able to escape, and its greediness is never to be satisfied. By one gripe of the jaws, they can cut a man in two. A red hot cannon ball is sometimes lowered over the side to one of these disagreeable followers of a ship, which the seaman has the satisfaction of seeing the shark receive, into his yawning throat.

At the pearl fisheries of South America, where white sharks are numerous, visiting the mighty caverns in the rocks, the water being so clear, that a small object may be seen at considerable distance, the divers, familiar with the character of the monster, in their descents for the oyster, are obliged to go armed, in self defence. For this purpose, some carry a long sharp knife. As the shark's mouth is placed somewhat under the head, he endeavors to get over his intended victim, and if he discovers no disposition in the Indian to move, gently settles down over him with his horrible mouth widely

extended. With the coolness of a philosopher, the instant he is near enough to be reached, the diver plunges the knife into his vitals. A very ingenious mode, which is practised, says a writer, from whom these observations have been principally extracted, is for the diver to carry down with him four or five hard wood sticks, about two feet long, sharpened at both ends. In case he is likely to be disturbed in his search for the oyster, by the visit of this king of sharks, he thrusts one of the sticks between his jaws, as he is in the act of closing them. This props them asunder, and the force with which they are brought to act on the stick, securely pins both ends into the bones, — and away he goes, without the possibility of a remedy. Instances have been known of an Indian, who was so sharply set upon, that he gave away three sticks in succession, before quitting his dangerous post.

At the Marquesas Islands, where this shark abounds, the natives swim in the midst of them quite fearlessly; and the only reason why more of them are not devoured, must be the peculiar ease with which they are supplied with large fish. Whenever, however, a native is so unhappy as to be caught by one of them, his associates never exert themselves in the least, to extricate him, because it is a common matter of belief there, that sharks never seize any

but the wicked — or transgressors of law, and therefore the man deserves to die.

A gentleman of our acquaintance informed us, that he saw a young girl swimming from a Boston vessel, waiting to receive a cargo of sandal wood, with a heavy bar of iron on her shoulder, which she had contrived to steal from the deck. She swam under water a considerable distance, before coming up for breath, but the moment she was seen, the boats put off, with the expectation of recovering the bar.

Just as the boats were so near that she was fearful of being struck with an oar, which was raised by a man in the bow, she plunged a second time — the boats pursued the track, but as she came up to the surface, still holding the iron, a "*mighty white shark* swallowed her at one effort; — the velocity towards his object being so great, that as he rolled upward, the girl was driven down his throat."

He also saw a shark seize a man by the leg, just below the knee, who, at the instant, being just ashore, grasped a projecting stone on the beach. The Shark drew with all its might, but the man held on, screaming most piteously for aid, but, although many of his comrades were near, no one came to his assistance. His leg was dreadfully lacerated, and the bone crushed: — in that con-

dition he was exhausted by the loss of blood, and the shark gained its object.

West India negroes, sometimes show a fearless dexterity in diving in among these sharks, with keen knives, purposely for the pleasure of butchering them. On the coast of California, the Indians, occasionally sustain extraordinary combats with the same species, for the amusement of European spectators.

Notwithstanding the ferocity, and apparently insatiable appetite of the white shark, it is said they will not touch a fowl having the feathers on.

In the history of Barbadoes, and in the relations of voyagers to the South Sea Islands, all that is shocking in the history of this creature may be found.

In the records of Aix, a seaport of France, in the Mediterranean Sea, is the account of a shark, taken by the fishermen, twentytwo feet long, in whose stomach, among other undigested remains, was the headless body of a man, encased in complete armor.

A friend has sent us the following note — for the truth of which he is ready to pledge his reputation.

"Some years ago, a young gentleman going passenger to the Island of Jamaica, when near the port of destination, was drowned. A short time

after, the uncle of the gentleman was on board a vessel in that region, the crew of which caught a large shark. On opening him, a common practice of sailors, in the stomach they found, among other things, a gold watch, chain and seals, which being examined, were at once recognised by the uncle as the very same he had given his nephew, at the time of sailing."

The æsophagus of this despot of the sea, is so capacious, that a full sized man can readily be taken down whole. We possess, in a collection, the dried jaws, which, opened, like the clasp of a purse, will admit the shoulders of an adult person. This fact, of the width and extensibility of the throat, has given rise to an opinion that this was the fish that swallowed Jonah.

But we neither believe, nor infer from the declaration in the sacred narrative, any such ridiculous supposition. The words are these, viz: — "Now the Lord prepared a great fish to swallow up Jonah." Such is the anatomical structure of the teeth, in all the larger varieties of shark, with which naturalists are conversant, that nothing can be very conveniently extracted from the stomach, through the æsophagus, which has once been admitted there.

Like the entrance of a mouse-trap, there is free admission, but no possible retreat. This mechan-

ism is particularly necessary in the economy of the shark, — obliged by the law of its nature to subsist on living animals, — which, were it not for the singular provision in pointing all the teeth backward, and the prickly spines in the gullet, directed the same way, would escape almost as soon as swallowed.

The same mechanical arrangement is noticeable in the throats of all the serpents: the teeth are not for mastication, but solely for holding and preventing the escape of the prey. We therefore place implicit confidence in the biblical account, that God created a fish, expressly to accomplish the miracle of swallowing, and subsequently ejecting the undutiful prophet upon the dry land.

Pliny's close observation may be inferred, from a statement he makes, that the shark turns on its back to bite, unless it settles over the object, — an observation corroborated by succeeding writers.

The tail being a powerful organ of destruction, as soon as the animal is drawn on the deck of a vessel, the seamen usually cut it off immediately, with an axe.

When the skin is nicely manufactured, a kind of leather is made, called *shagreen*, used in covering mathematical and surgical instrument cases.

Blue Shark, — *Carcharias Glaucus.* Blue sharks seem to be universally distributed over the world: navigators have never penetrated a sea in which they were not seen. They have a somewhat slender body, of a deep slate blue, on the back and sides, but the color is considerably lighter under the pectoral fins and abdomen. They have, beside, a long, pointed snout, a bilobed tail, of which the lower one is the longest. Usually, they average from seven to fourteen feet in length. Vessels are followed by this shark, sometimes, hundreds of leagues, without cessation. Seamen affirm that it is exceedingly greedy of human flesh. This opinion has arisen, probably, from the circumstance that the species is so widely diffused, that a body is scarcely lowered into the water, in any latitude, before some of these voracious Bedouins of the sea make their appearance.

Ælian assures us that when their young are in danger, they rush down the throat of the mother for security. The young of this species are hatched from the egg, in the coiled oviducts of the female, and therefore, when expelled, are not only alive, but exhibit, instantly, their natural character, by seizing with their tiny mandibles, anything that comes in their way.

To each young one, is suspended, by the umbilical cord, a sack, in which is enclosed the yolk

of the egg from which they had their being. This highly nutritious substance is slowly absorbed through the duct, into the stomach, and finally, the cord shrinks and drops off.

By the time this curious process is completed, adverted to in the physiological proem, the teeth are sufficiently developed to hold the prey they may overcome. To those who often witness this appendage to young sharks, in calms, at sea, this explanation, we trust, will be satisfactory.

During the excessive heat of summer, attracted by the odor of the floating offals from a port, it is no uncommon circumstance for them to penetrate into the docks. Their sense of smell is admitted to be exceedingly acute, or they never would pursue vessels for such long periods together, when persons on board are laboring under putrid diseases. When they have attained the object of pursuit, by unceasing perseverance, the chase is at once given up.

Bathing, therefore, in the warm season at low tide, in the vicinity of wharves, is certainly an exposure, though it may so happen that a series of years may elapse without any unpleasant occurrence from such a source.

A year since, while a lad was fishing in a small boat, in the outer harbor of Newport, R. I., his

boat was attacked in a most ferocious manner by a shark. After the first attack, the shark leaped from the ocean into the boat, which, from his flouncing he would have sunk, had not another boat, near at hand, come to the relief of the boy. With great difficulty the monster was killed. He measured eight feet in length, was of the most ferocious kind of sharks, called by mariners *man-eater*. He weighed between three and four hundred.

The Newburyport Herald relates an occurrence which happened in Rowley, not long since. Mr. David Pickard, who was on the marshes, by a narrow creek, near the mouth of Rowley river, saw a large fish — a shark, as he supposed — making up the creek, with his back above water. Being provided with a gun, he discharged it at the creature, when it made a monstrous leap, and deposited its huge bulk high and dry upon the land. It measured nine feet in length.

The following fact, published in 1831, on the authority of Captain Clark, of the brig Stranger, from St Bartholomews, will corroborate the testimony of naturalists, in relation to what has been said of the mode of bringing forth its young, — so different from most other aquatic tribes.

" Having caught a shark, nine feet long, it was opened on deck, and found to contain fiftytwo

young ones — each of which measured seventeen inches in length, and all were very exactly of the same size."

During the year 1831, a man was attacked in his boat by a shark, overcome and devoured ; in the Bay of Boston.

In "*The Life of a Sailor,*" is a narrative of the wreck of a vessel off the Havana. The crew took to the boat, which upset ; they succeeded in righting it, and while two men were bailing with their hats, a shark was seen to approach. No language can convey an idea of the panic which seized the struggling seamen. Every man now strove the more to obtain a moment's safety. Well they knew that one drop of blood would be scented by the everlasting pilot fish, the jackall of the shark ; and that their destruction was inevitable, if one only of these monsters should discover the rich repast, or be led to its food by the little rapid hunter of its prey.

A few minutes after, about fifteen sharks came right among them. The boat was again upset by the simultaneous endeavor to escape danger, and the twentytwo sailors were again devoted to destruction. At first, the sharks did not seem inclined to seize their prey, but swam in among the men, playing in the water, sometimes leaping about and rubbing against their victims. This was

of short duration. A loud shriek from one of the men announced his sudden pain; a shark had seized him by the leg, and severed it entirely from the body.

No sooner had the blood been tasted, than the dreaded attack took place: another and another shriek proclaimed the loss of limbs. Some were torn from the boat, to which they vainly endeavored to cling — some, it was supposed, sunk from fear alone. The sharks had tasted the blood, and were not to be driven from their feast. By great exertion, again the boat was righted, and two men were in her; the rest had all perished. The two survivors resolved, with gallant hearts, to redouble their exertions. They lightened the boat sufficiently not to be overset.

The voracious monsters endeavored to upset the boat; they swam by its side, in seeming anxiety for their prey; but after waiting some time, they separated. The two rescued seamen, in spite of the horrors they had witnessed, soon fell asleep, and were the next day fortunately picked up by a vessel.

Fox Shark, or Thrasher, — *Carcharias Vulpes*. Perhaps no class of sea stories are more common than accounts of combats between the *thrasher* and the *whale*, — the latter of which, is always said to be beaten most cruelly by the

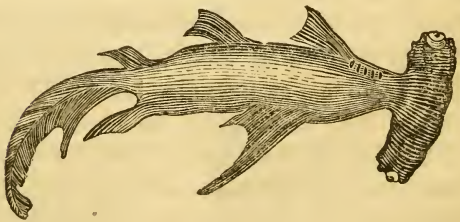
thrasher. We apprehend, however, that there is some mistake in these supposed battles.

The thrasher may always be known from all other varieties, by the upper lobe of the tail, which is as long as the entire body. Generally, the thrasher averages from nine to fourteen feet. They are seen on our coast very often, in the summer, running with great swiftness, — the tip of the long tail fin cutting the water.

GEN. ZYGÆNA.

Hammer-Headed Shark, — *Zygæna Vulgaris.* Shovel-headed shark, is another name, by which this remarkably constructed fish is known to American

HAMMER-HEADED SHARK.



seamen. But little time since, a sailor offered one, recently caught, for sale, which he wheeled through the streets of Boston, on a barrow, attracting crowds of people, who gazed upon it in perfect wonder.

The head, from which particular part it obtains its vulgar name, is comparatively thin — and resembles, in relation to the body, a brick, laid across the head of a fish. Such, indeed, is the structure, that the eyes are ten, twenty, and twentyfive inches apart, according to the size of the body, — precisely as it respects each other, as it would be if an eye were placed in each end of the brick. Without a drawing, however, it is utterly impossible to form a right conception of its curious form. The body is brown on the back, — though generally partaking of the leaden, the prevailing color of all the sharks.

The species under examination, in writing this article, has a falcate first dorsal fin, on the rise of the back, and a second, quite small, near the end of the tail : — the entire length is short of nine feet.

Surely, if anything in animal organization, seems like the result of some sport of nature, the hammer-headed shark is an instance of it. If the body of a large flounder, deprived of its head and tail, were laid across the head of a blue shark, it would somewhat resemble the gluing on of the head to the body. The eyes are at such a distance, that at first view, one is led to suppose it a monstrous production.

It has been conjectured that the eyes, from being

lodged at the extremities of the cartilaginous wings, as it were, of the skull, can be approximated on the under side, so that the fish may look into its own mouth, far back, on the under side, even under the thick substance of the neck. Careful examination, however, on a recently caught, flexible shark, convinces us satisfactorily, that no such effect can be produced.

By some authors, it is called the balance-fish; because it is said to balance in the water, as though the centre of the body were supported on a pivot, while the head and tail, alternately, ascend and descend. Others give the appellation of *sea-mallet*, from the resemblance which the body has to the handle of a mallet, inserted into the transversely laid head. This mallet head is gently curved in front, and brought quite to an edge, so that it will cut its way with ease through the water.

The eye very much resembles that of the horse, being nearly of the same dimensions. In a dried specimen of a young one, four feet long, the eyes present a hard shell, showing that they were calculated for deep water. In the mouth is found a liberal supply of four rows of teeth, lancet-shaped, and serrated on their edges.

Scarcely a season passes by, in which fine specimens are not taken in the vicinity of Nahant, about the Cape, &c.

In 1805, three powerful *shovel-nosed* sharks, were taken in a net, at Sagharbor. The largest was eleven feet in length. On opening him, many detached parts of a man were found in the abdomen, which were collected and buried. A striped shirt, patched, was also taken from the stomach.

Very opportunely, while writing, Captain Knott Martin, on a return voyage from Cape Hayti, has presented us with a fine specimen of a young one of this species, only two feet and one inch in length; one inch and a half in diameter: — the eyes are five inches apart, and in the flexible jaws is a dental apparatus, truly frightful. There can be no doubt, from the exhibition of muscular strength, this shark makes prodigious slaughter in appeasing its voracious appetite.

Mr Fitzwilliam, an English gentleman, recently from Malta, has politely forwarded us the following note, with other interesting matter on natural history, illustrative of the character and habits of the shovel-nosed shark.

"While lying at anchor near the Bell Buoy, in the Isle of France, we were surrounded with numerous sharks, of the shovel-nosed species, — two of which appeared of so enormous a size, that we determined, if possible, to catch them. Our hooks were baited with four-pound pieces of pork, but

these appeared too small morsels for our voracious customers, — and for two days we were unsuccessful.

"A young goat happening to die at this time, it was immediately fastened on a hook for a bait; it had not been overboard many seconds, when one of the sharks was seen to approach, smell of it, turn on his back, and in a trice, swallow it. After considerable difficulty, we hoisted this monster on board, in doing which, with a stroke of his tail, he shivered the bulwarks near him, into a thousand splinters; and it was, indeed, with great difficulty we despatched him, even though the tail was immediately chopped off to prevent further damage to the property on deck. He measured eighteen feet in length.

"It was now suggested, it would be worth while to bait another hook, with the entrails of the first captive. In a few minutes the hook was in readiness, and a second shark was taken, which was longer and larger than the other, to appearance; but it was so violent in its struggles, that it succeeded in snapping off the chain, attached to the hook, and escaped.

"The jaws of the one we saved, when cleaned, were so large as to be slipped over the body of a man. From the liver, alone, were procured more than ten gallons of oil."

Zygæna Tiburo, belonging to this family, having warty spots, is also occasionally taken by the fishermen, — dried specimens of which may be found in the museums. The color is much like the one in the preceding article, though, if anything, the head is sharper — and the skin, between the pectoral fins, near the region of the branchiæ, is of a clear white, — shading into a yellowish tinge towards the tail.

GEN. SELACHE.

Basking Shark, — *Selache Maximus.* Between the head and body, there is not a good proportion, — the first being comparatively small and snake like. When the branchial openings are thrown asunder, from running almost round the neck, they give the animal the appearance of having its throat cut by several deep incisions. The color of the skin is nearly that of sheet lead; — one large dorsal fin, shaped like a ploughshare, rises on the back; —the teeth are small and sharp, and in vast numbers. On this coast, they have been captured, measuring thirty feet, usually the harpoon is the surest method of securing them.

A few years since, at the time the appearance of the sea-serpent produced so much excitement in the vicinity of Gloucester, a party of gentlemen from Boston, armed for successful combat, with

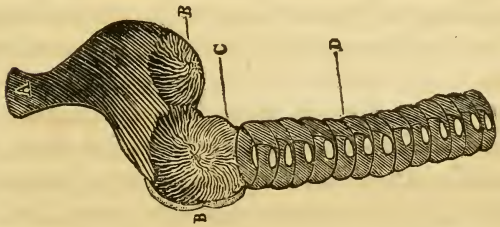
that emperor of serpents, fell in, we have been informed, in the course of their excursion, with one of these harmless, lazy fishes. Its dimensions were so colossal, as to induce some to believe, by the aid of a little imagination, that this was the mighty leviathan, which had been magnified into a tremendous snake, one hundred feet long. The existence, however, of such a creature as the serpent has been described to be, by the most unobjectionable evidence, is proved as clearly and conclusively, as human testimony can establish any truth.

From a careful examination of the digestive organs, there being an unusually long intestinal tube, it is conceded by naturalists, that the basking shark feeds on vegetable food entirely, and therefore, unless unreasonably excited, is a peaceably disposed, harmless, inoffensive being.

Beside the track of intestine, within its calibre, there is curious provision for retaining the contents, till all the nutritious matter is completely extracted. This consists of a valve, — or to make it more clearly understood, the inner plate is precisely like a winding stair-case, or the twist of a screw-auger; thus, instead of passing down freely, and unobstructed; by this arrangement of the screw, the food is kept rolling over a vast surface of absorbent vessels.

Because this shark seems to delight in lying upon the surface, basking in the hot sunshine, the name of basking shark has been given it, by common consent. Though really formidable in appearance, by the concurrent testimony of mariners, it is allowed to be a dull, unsuspecting, harmless creature.

INTESTINE OF THE BASKING SHARK.*



This disposition must depend, to some extent, on the quality of its aliment, which is altogether marine plants. How far the habits of this animal

* Stomach of the basking shark laid open, and the coats of the intestine dissected entirely away, in order to exhibit the valvular structure within.

A. The cardiac orifice of the stomach.

BB. The converging muscular fibres about the pylorus, or lower opening of the organ.

C. The commencement of the winding valve, as it is termed, — which is a continuous shelf, like a flight of winding stairs, jutting from the inner circumference towards the centre.

D. refers to the width of the valvulæ conniventes.

will warrant a comparison with the description that is given in the book of Job, of the Behemoth, we leave to others to judge. "Behold now the Behemoth, which I made with thee; he eateth grass as an ox."

That the structure within, is upon the simple plan of the digestive organs of herbiverous quadrupeds, must be admitted by those who study comparative anatomy.

Beza, and others, learned in the history of the sacred writings, contend that the Leviathan, was a crocodile, which was the opinion of Bochart; but we can discover nothing in the description of that formidable monster, that bears any more resemblance to it than the basking shark; which answers the precise figure of the Behemoth; in the whole Bible the word *crocodile* does not once occur.

Pennant informs us that they swim with such rapidity and violence, that there has been an instance of a vessel of seventy tons having been towed away by one of them, against the wind, by the irons lodged in its body. It is further said of the Behemoth, "His bones are as strong pieces of brass; his bones are like bars of iron."

As far south as New Jersey, they have been taken, of greater dimensions, than at the north. By good authority, we have been told of one or

two, that measured not far from forty feet in length.

Within the mouth a kind of whalebone is pealed out, which has also given it the name of the whalebone shark. On the best authority, it is said they are viviparous, — the young, a foot long having been taken out of the bodies of the females. Simply the liver, has weighed a thousand pounds, in some of the large ones, caught on the northern coasts of Europe, — yielding a profitable quantity of oil, for which purpose they are sought.

Not appearing to be very timid or susceptible, they will lie perfectly quiet, till the intrepid harpooneer, who has approached him cautiously, drives the instrument of death into the vital regions, before he begins to move with the warp.

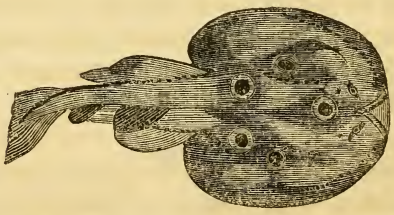
GEN. TORPEDO.

Torpedo —The "Numbing Fish,"— *Torpedo Vulgaris.* That a variety of this remarkable fish has been taken on these northern shores cannot be questioned, though we frankly confess our inability to procure one. Individuals who have accompanied fishing parties, corroborate the testimony of those who assert that they have drawn up a strange creature, something like a skate, which they not caring to preserve, or even handle, in at-

tempting to cut out the hook with a knife, instantly felt a strange sensation in the arm, as though a cord had been suddenly drawn round it.

As there is a fish known to those who habitually fish, inshore, for a living, the whole year round, as the "*numbing-fish*," or *benumbing*, it is very conclusive that it has been seen: — resembling, somewhat, the skate, it would not be strange if those who accidentally drew them up, should suppose it one of them, particularly if it was jerked from the hook, — a common mode of disengaging the skate.

THE TORPEDO.



The Electric-Ray, or Topedo, is found in most of the European seas, but in Torbay, England, particularly, they are often drawn up in a traul net, with others; — sometimes they catch the hook, and then it is, in handling them, that they exhibit that curious electrical property, which has given them the name of torpedo.

Icthyologists describe about twenty species of

the ray, but this, alone, possesses to a considerable degree, the electrical property. In structure, the torpedo does not seem to differ essentially from the family of rays in general. The electrical organs are lodged each side of the gills, — reaching to the cartilages of the great fins. Each lateral battery is about five inches long — being constituted by plates of membrano-cartilaginous substance, the interstices of which are filled with a gelatinous fluid. Their color is a dusky brown, — the skin is smooth, the tail short, and the mouth small, with five breathing apertures.

The apparatus of the torpedo, is analagous, in character, to that of the gymnotus, or electrical eel of Surinam. In the summer of 1827, Thomas Trask, Esq. American Consul at Surinam, succeeded in bringing a live one to Boston, in a barrel of water. Although we had the best opportunity, two days in succession, for experiment, with extreme regret, we were completely unsuccessful in getting an electric shock. It was irritated, — roused with iron as well as wood, but there was no exhibition of that power which we hoped to have experienced.

Either the new climate, the different kind of water in which it was kept, its being changed daily, or the influence of other causes, deprived it of the faculty of secreting electricity, or its spirit was so subdued, that it was indifferent to stimuli.

This eel was a little more than three feet in length, considerably larger than a man's wrist, and of a deep slate color. While confined in a vat, on the eve of sailing, Mr Trask ordered four negroes to go and put it into the barrel, in which we afterwards saw it, but they were repeatedly prostrated to the ground in the attempt, declaring that their elbows were broken.

General Verveer, a gentleman of great respectability, who resided many years in Surinam, assured us that he once had an electrical eel, of such extraordinary dimensions, that it was placed in a trough where the cattle were in the habit of going to drink, with reference to sending it abroad; but some mules being turned loose, went directly to the spot to drink — and four of them were killed in succession, the moment their noses touched the water.

This electricity both in the torpedo and the gymnotus, is entirely under their control, — and was probably bestowed on them for the purpose of overcoming their prey. The eel has no teeth,— therefore it has a compensation in the wonderful machine within its own body, by which it can repeat the benumbing influence till it has gorged the victim on which the power has been exerted. Otherwise, in their habits, they may be considered in the water what the anaconda is on the land.

GEN. RAIA.

THORNBACK, — *Raia Clavata*. Notwithstanding the assertions of some to the contrary, others who have seen the thornback in England, contend that it has been taken on this coast.

THE THORNBACK.

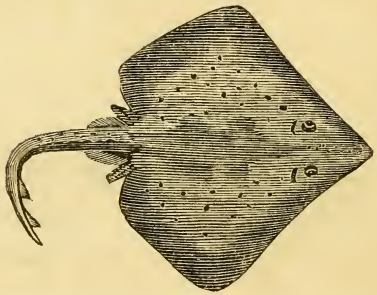
The body is cineritious, rough, with bony tubercles, — each of which is furnished with a hooked spine, — the dorsal row being the longest; the tail is longer than the body, loaded with three rows of spines.

Usually, they are from two to three feet long, when fully grown. We cannot assert positively that we have seen one, yet we have an indistinct recollection of such a circumstance, in the deep-water near Scituate, about eight years ago.

SKATE, — *Raia Batis*. All the borders of Massachusetts are visited by the skate, some of which are in breadth as much as four or five feet, with a brown body, rough skin, — hav-

ing a dirty crust of mucus and mud — and a long tail: it may always be known to those who seek it for cabinets.

THE SKATE.



It has five branchial openings on each side, partly concealed by being underneath; two dorsal fins near the root of the tail; small teeth, of a conical form, with broad bases. Males may be known from the females by crooked or hooked spines on the pectoral fins. The ova are brown, cariaceous, and square, having four long arms, giving the egg-shell, which washes upon the beach, the appearance of a hand-barrow.

Let it be remembered, that the skate is a broad, thin, flat fish, terrific and disgusting to look upon, — possessing the voracity of the shark, without its rapidity. Their home is at the bottom, from which, with singularly constructed optics,

they can look upwards on all that passes over.

Cased in a partially bony shell, its edges seem to be eked out by broad gelatinous wings, with which they flap through the water, as a bird uses its wings, in aerial progression. In shoal, calm water, we have often seen them lying at ease on the mud of inlets, varying in size from an inch to five feet.

During the months of March and April, the females cast their purses, or spawn; from three to five hundred eggs, have been extruded from one of them, at a time. In the Spring, several males may be seen pursuing one female for hours together.

Directly before our dwelling, on a warm day in July, as the tide was receding, an unusual splashing of water attracted attention, and resulted in the capture of a skate, whose diameter was equal to that of a wagon wheel. When thrown upon a wheel-barrow, a strong man could scarcely push the load before him, to the house.

Skates are in less danger of being destroyed, than most other fishes, excepting when young. After having grown to a certain extent, even sharks appear unwilling to attack them; — hence they are exceedingly numerous. Lobster-men spear the skate, for bait, by boat loads, and in

England, the skirts or wing are considered excellent eating.*

Another reason why sharks do not disturb them, when they become large; arises, it would seem, from a conscious inability to swallow the morsel. Prowling, says a writer, at the bottom of the ocean, in the dark caverns beyond the ken of human vision, and in cavities, dark and horrible beyond what the imagination has ever conceived, they, perhaps, continue to grow, till they become monsters indeed. As we have no exact knowledge of the period to which the lives of fishes are pro-

* No city in the world, is better and more plentifully supplied with fish, than London. Turbot and brill are carried there from the coast of Holland; Salmon from the rivers in Scotland and Ireland, — a few however are caught in the Thames, — at the mouth of which mackerel and cod fish are taken. In 1828, the following calculation was made of the quantity of fish sold at Billingsgate.

Plaise and skates	50,754	bushels.
Turbot	87,958	"
Fresh Cod	447,130	"
Herrings	3,336,407	"
Haddocks	482,493	"
Mackerel	3,076,700	"
Fresh Salmon	45,446	"
Lobsters	1,954,600	"

To supply the actual demands of the people with this food, it required 3,827 vessels; the number of fishermen, therefore, exclusively devoted to this particular business, and subservient to that metropolis alone, is truly immense.

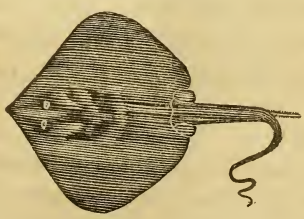
longed, it is fair to conclude, from the vast dimensions of some individuals of this species, that they may live from one century to another.

A skate was killed in the vicinity of Guadaloupe, measuring nearly twentyfive feet in length by fourteen in breadth. This fact leads to the supposition that others may yet be discovered, by the side of which this would be a mere pigmy. Time, perhaps, may yet reveal the secret, that the kraken, now considered an imaginary being, so vividly pictured by bishop Pontoppidan, whose back, rising above the surface, resembles an island, is nothing more nor less, than one of these monstrous productions.

TRYGON.

Sting Ray, — *Trygon Pastinaca.* Occasionally, but by no means very frequently, the sting-

THE STING RAY.



ray is taken with a hook, in fishing in about thirty

fathoms of water. The body is of an oval form, of an olive color, and smooth. It has a sharp nose, a small, slender tail, armed with a long serrated bone towards its root. Usually, on these shores, it averages from one to two feet in length, and is denominated the *saw-tailed* skate.

ORDER III.—STURIONES.

GEN. ACCIPENSER.

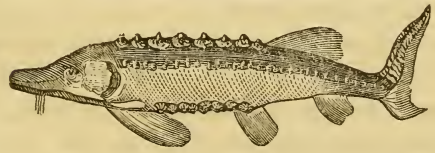
The fishes of this genus, have the general form of the sharks; but their body, remarks Mr Park, is more or less covered by long prominences, in longitudinal rows. Their eyes and nostrils are on the side of the head, the dorsal fin behind the ventrals, and the anal under it. Sturgeons ascend the rivers from the northern seas, at certain seasons, in vast numbers, and their fishery, therefore, becomes an object of peculiar importance.

Sturgeon, — *Accipenser Sturio*, is an anadromous, subtle fish, solitary in its habits, voracious, and when fully grown, of prodigious size and power. On this coast, the sturgeon is often seen, leaping from the water, but is not often taken.

It seems to delight, particularly, in lying about the estuaries of rivers, into which it frequently penetrates, hundreds of miles, returning to the ocean again, as the supply of food fails, or the formation of ice commences, in northern latitudes. Its abiding place is not at sea, but always on the border of the ocean, where muddy bottoms predominate.

Without teeth, it snaps at its prey most vigorously, and rarely fails of overcoming the object of its choice, either by artifice, or dint of extraordi-

THE STURGEON.



nary strength. Between the end of the snout and mouth are four cirri, resembling the tendrils of a vine, or earth worms, which the sturgeon exhibits to other fishes, much to its own advantage.

Belonging to the cabinet of the Boston Society of Natural History, is the bill or spatula of the spoon-bill sturgeon, of the Ohio River, which is really a curiosity. Being divested of the skin, it presents an osseous blade, three and a half inches wide, at the further extremity, and two feet and one

inch long, including some portion of the head, — gently curved at the end, like a spoon handle.

It is a complete web of bony fibres, running in every direction, apparently in the wildest confusion, yet its strength and elasticity entirely depend on this peculiar structure.

Dr Hildreth, of Marietta, says that this is also called the *paddle-nosed sturgeon*, — the *Polyodon Feuillé* of Lacipede, and the *Spatularia* of some other writers. The sturgeon from which this spatula was taken, was speared at Letart's Falls, in June, 1830, a few miles above Pomeroy's coal bank, Meig's county, 260 miles below Pittsburg, and weighed forty pounds.

At the great falls of Lawrenceville, the same fish is called the *bill-fish*. For particulars, see Silliman's Journal, Vol. xii, No 2.

Settling itself into the soft ooze, with its head towards the current, — the sturgeon allows the cirri to float, just above its nose, — and there it patiently waits, till some fish, allured by the sight of the buoyant tendrils, — dives to pick them up, when the crafty deceiver pounces on its unsuspecting prey, with unfailing success.

In summer only, the sturgeon is seen in Boston harbor, from six to nine feet in length, leaping from the water. The force with which it propels itself towards an object on the surface, carries it

completely out. It is said, but with how much truth, is not easy to determine, that it does not hesitate to leap out in order to fall on other marine animals, for the purpose of overcoming them by its weight. In this way we are continually hearing of their falling into boats, when the weather is calm.

In the Middletown Conn. Gazette, of July, 1831, is an interesting acccunt of a sturgeon, weighing one hundred and eighty six pounds, which unceremoniously sprang into a small boat, bound from that place to Rocky Hill, and in the fall broke an oar and one of the seats.

Says the Hartford Courant, in the summer of 1830,—"Last Saturday afternoon, as sundry persons were employed in painting the hull of the schooner Exact, now lying at our wharf, they were suddenly interrupted in their labor by an abrupt and unceremonious visit from one of the inhabitants of the river. They were standing in a scow which was drawn along side the schooner, surrounded with their paint-pots, and busily plying their brushes, when a sturgeon about seven feet long and three feet in circumference, making his way between the scow and the schooner, where there was just room enough to afford a passage, dashed in among the astonished painters, overturned the pots, mixed their various contents in one mass, and having thus formed a new combination

of colors, took the business into his own hands. Substituting his tail for a brush, he commenced operations on a large scale, and as he flounced about in his new quarters, scattered the paint in every direction, spreading it over the side of the vessel and scow, and not omitting to bestow a liberal coat on the painters themselves. He was not long permitted, however, to display his skill in his new line of business, for the painters not relishing this species of monopoly, commenced a united assault on their new competitor, and despatched him without mercy."

No account is made of them, as food, owing, perhaps, in some measure, to their scarcity, in this vicinity; but at New York, and particularly at Albany, they were once esteemed. In Europe, the sturgeon is much prized, being variously prepared by smoking, pickling and drying.

In this country, the sturgeon fishery appears to be wholly neglected, though formerly, vast quantities were taken in Virginia. In the cold regions of Russia, the sturgeon is considered delicious; thousands upon thousands of tons are salted in barrels for exportation.

The Danube, Volga and Don, are among the most famous sturgeon localities in the world. We are assured by a traveller, that a grand dinner cannot be given in Russia, without sterlet, *accipenser*

ruthemus, a small species of sturgeon. "When brought alive in summer, from Archangel to Moscow and St Petersburg, they have been known to cost from five hundred to a thousand roubles each. A soup prepared from the sturgeon, commingled with the most expensive wines, according to the same narrator, has cost three thousand roubles."

In the time of the Emperor Severus, the sturgeon was considered so much of a royal dish, that it was carried to the table by servants adorned with coronets, and escorted by musicians. This may have been the origin of a ceremony once practised in London, on lord-mayor's day, — the mayor elect being obliged to present the king or his proxy with a *platter of sturgeon.*

In English Law it is still considered as exclusively belonging to the king, — who also is entitled by an ancient, grave, parliamentary concession, to all whales which may be cast on the seashore of the realm, — to be equally divided between his majesty and his royal spouse; — the head, as the most noble part, being for the king, and the tail for the queen; out of which she was to be supplied with whalebone for making her stays. This was particularly an unfortunate division for her majesty, as the whole of the article in question is found in the jaws.

The Indians of America used their bones, or

scales, which are exceedingly hard, for rasps and graters.* *Caviare*, an excellently flavored, though, perhaps, rather indigestible food, is made of the roes, pressed into hard cakes, about one inch thick, by four square.

During the long Lent of the Greek church, and the weekly fast days, exceeding in the aggregate, four months, sturgeon is the principal food of all European Russia. It was calculated in 1794, that 1,750,500, yielded 4,366,800 pounds of caviare. Its value as a wholesome food may be inferred from this statement. The estimated value of the sturgeons caught in Astrakhan and the Caspian Sea, alone, is 1,760,405 roubles annually; which sum is realized from England, by the sale of isinglass and caviare, now getting into common use.

The Persians will not eat sturgeon, but rent the grounds of the Sallian to the Russians, who in the spawning time, have taken with a hook and line, fifteen thousand large sturgeons in one day. These facts are introduced in this place, with a hope that they may resuscitate the long neglected, but profitable sturgeon fishery at the south.

In our collection, is a small fish, evidently very

* The sturgeon is the largest fish in the Lakes. The sturgeon of Lake Erie has no dorsal fin, — otherwise it resembles the sturgeon of the rivers and ocean, and has the same habit of leaping or vaulting out of water.

young, that exhibits a relationship to the sturgeon, and yet, is altogether different. From the central part of the plates which characterize the tribe, are strong, short knobs; a large head, similarly armed; prominent eyes, slender fins, and jaws destitute of teeth.

What is most interesting, between the pectoral fins is an oval surface, rather prominent, by which it appears that the fish has the power of adhering to surfaces, like the remora and lump-fish. This was taken in a lobster-pot, by the keeper of the Boston light-house. At a future period it will be investigated.

CLASS II.

OSSEOUS FISHES.

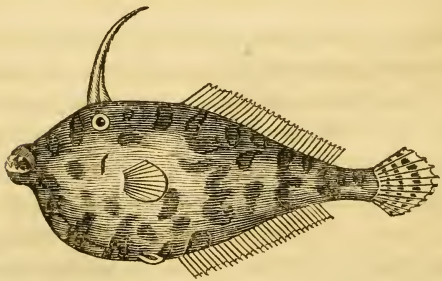
IN THIS DIVISION THE SCULL IS UNITED BY SUTURES.

ORDER IV.—PLECTOGNATHI.

GEN. ALUTERES.

FILE FISH.— *Aluteres Monoceros*, the file fish of Linnæus, is scooped up in nets, in calms, about fifty miles at sea, but under circumstances, however, which render it doubtful whether it

THE FILE FISH.



can safely be denominated a native fish. It may be recognised by a bony spine, as one of the boundaries, anteriorly, of the dorsal fin, and eight teeth in each jaw.

Our specimens were obligingly forwarded by Captain Couthuoy, of Boston, a gentleman to whom our naturalists are under peculiar obligations.

GEN. OSTRACION.

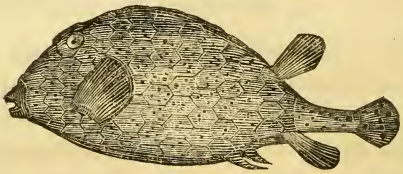
All the individuals of the genus ostracion, seem to be boxed up in a tri-cornered chest, for their shell is constructed of plates, which unite to form a perfect shield, — in which there are openings to allow the exit of the tail. The tail, fins, mouth, and the branchiæ, are the only parts that will admit of motion.

Trunk-Fish. — *Ostracion Triqueter*, inhabits the vicinity of Long Island, New York, but rarely makes its appearance so far to the north as Massachusetts, unless driven on shore by the violence of storms, — and then it is presented as an empty shell, three sided, about one foot long, with a white dot near the centre of the hexagonal divisions or lines which define the original sutures of the plates. Boys cleanse the inside, and use them for lantherns, which are very comical contrivances.

Ostracion Bicaudalis. A beautiful specimen of this fish was thrown on the beach at Holmes's Hole, within a few months, and forwarded by Dr

Yates, of that place, to the Boston Society of Natural History, in whose cabinet it has been deposited.

OSTRACION BICAUDALIS.



The body is marbled, and dotted, as it were, with black. Near the vent, two spines, are sent directly backward, on the plane of the abdomen, whose points approximate a very little; these are sharp, stiff, and hooked, much like a canine tooth. Writers place the locality of this genus in the Indian seas; but it is now morally certain that it also exists in this northern latitude, as all the specimens which have been cast on land, could not have been lost by collectors of curiosities, from homeward-bound vessels. Besides, the cutaneo-elastic substance which unites the fins, tail, lips, &c., to parts within the tri-cornered shell, shows most convincingly that it had not been long dead.

We possess various smaller specimens, from Trinidad, but this, compared with them, is vastly more interesting. It measures not far from four-

teen inches, and from one ridge or angle, to the other, three inches, — giving the highest arch of the back a circumference of nine inches. They are in their own element, what the armadillo, of South America, is on land.

GEN. DIODON.

Swell-Fish, Balloon-Fish, Blower, Puffer, — *Tetraodon Turgidus*. It is not common to meet with the swell-fish at any other season, than the heat of summer. Whenever caught with the hook, it is in fishing for cod and haddock; hence it is inferred that they feed upon similar food, and swim at about the same depth.

The back has a tawny saffron color, the skin rough, — giving the sensation to the finger of sand paper. The only apology we can make for not having dissected one of them, with reference to explaining their internal organization, is the poor one, that there has not been time since the commencement of this essay. Relying, however, upon the assertions of comparative anatomists, the following seems to be the peculiarity of its structure.

A valve is so constructed in the fauces, over the orifice of a tube, communicating with an extensive series of air-cells, opening downwards, that by drawing the atmospheric air in at the

mouth, it presses the valve down, and thus distends the cells, but the pressure from behind throws it back, so that none of it can escape through the external orifice.

Just as it comes to the surface, it seems to inhale a prodigious volume of air, that at once swells the whole body into the shape of a balloon. Before this, the body is comparatively slender. As the fish may be rolled about like a foot-ball, bounding and rebounding, when thrown, precisely in the same manner; it evidently has not the power of allowing the air to escape.

If stamped upon, the bursting causes a loud report. In the sun, the swelling increases so rapidly, by the expansive force of the pent up air, that the skin gives way with a sudden rent, accompanied with a loud noise. Thrown upon the water, it floats away partly on one side, resembling at a distance, (the belly being delicately white,) a white foam.

However, after a while the size begins to lessen, till finally the fish succeeds in getting under water again, and survives the trial. Probably the temperature of the water has some agency in condensing the air, till the valve, or epiglottis, by its own elasticity, re-acts, and by the openings, permits the confined air to escape.

The swell-fish varies from eight inches to one

foot in length. It appears, in consequence of a vertical cleft through the middle of the jaws, to have two large upper and lower front teeth.

ORDER V.—LOPHOBRANCHII.

The branchiæ of this order are of a peculiar character, and well worth the minute examination of those who desire an accurate knowledge of the anatomy of fishes. Instead of being pectinated, they are disposed in tufted pairs on the margins of the branchial curves. Above these, is the operculum; covering and attached all round, but having a foramen for the water to pass out through the tufts, from the mouth.

Such as are found in this section of the country, are small, four-sided, and harmless. Their eggs are floated onward through the oviducts, to be lodged in a little sac, constituted of the common skin, put upon the stretch, by their presence, under the tail in some, and under the belly in others — out of which the young escape, when they are hatched.

GEN. SYNGNATHUS.

Little-Pipe Fish, — *Syngnathus Typhle.* As we have in no instance seen two of these fishes

together it is inferred that they are solitary in their habits, somewhat like the sturgeon — being in some respects sturgeons in miniature.

THE PIPE FISH.

The tube of the mouth is long and slender, at the extremity of which, is the minute opening of the mouth. Eighteen plates enter into the composition of a hexagonal body, a little larger than a goose-quill, and thirtysix in the tail, which is square, but quite flexible.

Their ordinary length is from six to ten inches. Among the rocks at Nahant, after a storm, at Cohasset, and at Boston light-house, all our specimens have been procured. For preservation, the best mode is to dry them, as they loose nothing by it, if brushed over by a varnish, in which there is a mixture of aloes, to prevent the depredations of insects.

ORDER VI.—MALACOPTERYGII ABDOMINALES.

All the fishes of this order possess bony skeletons; the jaws are in one piece, and the branchiæ pectinated. All the rays of the fins are soft, except in some instances, the first of the dorsal or pectorals, and the ventrals are posterior to the abdomen.

The order includes nearly all the fresh water fishes, as well as those which migrate periodically from the ocean to the rivers. It may be said, with propriety, that most of the edible fishes also belong to this order. It is divided into five *natural families.*

FRESH WATER FISHES.

Thus far we have been considering the fishes, which are either entirely confined to the ocean, or are only occasional visitants of the fresh water. But in the river, there is a race which could not subsist in the compound element where the greatest proportion of all the varieties of aquatic animals known to naturalists, have their residence.

After the most careful examination of the anatomical structure of this class, there is noth-

ing discoverable in their external configuration, nor in the internal organization of the viscera, which can explain why it is necessary to reside in the one place or the other, or what obliges them to alternate from the salt to the fresh water.

Physiology, as yet, has thrown no light on this subject, which is only another evidence of the limited knowledge we possess of the wonderful operation of the laws that govern animal life. The rationale of the effect of the two kinds of water, must be sought for in the influence exerted by certain salts, in solution, on the atmospheric air with which they are commingled.

In the commencement of this essay, the fact has been adverted to, that fishes do not breathe either water or air, exclusively, but a mixture of both.

By the examination of a map of the United States, or Massachsuetts in particular, it will be observed that the origin of the water-courses in the country, are such, that by passing over different soils, in which various ores and other mineral productions are directly exposed to the action of the stream, they become impregnated or altered in quality, according to the distance they run towards the sea.

Particular families are fitted by the All-Wise Creator, to exist in particular regions, and at particular localities ; — and they are endowed with a

kind of vitality to resist the noxious qualities of the fluid in which they swim, that would be fatal to others. This curious arrangement in the plan of creation is most admirable, — contributing to the universal diffusion of animals over the whole globe.

There is not a spot of land on earth, nor a pool on the face of it, that is not teeming with its countless millions of organized beings, possessing all the necessary apparatus for supplying their physical wants, and for propagating their species. But the boundaries by which the animal creation is restrained, are not so arbitrary that no deviations are allowable : — the fish, or the quadruped, like man, can change its residence, — and by being gradually climated, the function of the vital organs become accommodated to the condition of a modified element.

Here then, we can find the origin of the creation of new genera ; — in the meeting of strangers, and in the aerial and aqueous influences effected on the offspring.

We have long entertained the opinion, that the sea is the natural habitation of all fishes. By the wandering habits of some, the fleeing of others from their enemies, and the operation of physical causes, they became gradually dispersed in the tributary waters of the great reservoir of the world.

To the same causes are also to be attributed the annihilation of species, now only found in a fossil state. Even the hardest rocks present the most perfect forms of extinct fishes — under the name of ichthyolites. Nor can it be doubted that changes are continually going on in the constitution of inorganic matter, which, while it blots wholly from existence distinct tribes, will also eventuate in the production of entirely new species.

To settle down in the iron-bound notion that the laws of nature are thoroughly understood, and that there cannot be anything new presented under the sun, is to confess our perfect ignorance of phenomena of the most astonishing character. Like the inexhaustible capacity of the human mind for knowledge, are the resources of nature, yet men too often complain that all the avenues to the study of Natural History have been travelled, all countries surveyed, and all the animal creation minutely pictured and anatomised, and that nothing remains to excite them to study, or compensate for the labor of investigation.

Alas! this is only an excuse for indolence — and thus thousands live, only to occupy space, without interesting others, or being enlightened themselves, and die at last, as they lived, without contributing one valuable idea to the storehouse of useful knowledge.

If one new fact can be added to the common stock of truth, it matters not whether it regards the one kind of science or another: — the accumulation, the increase of the capital, is what concerns every individual in the community. These remarks are made with a view to exciting particular attention to the study of the aquatic animals in the northern states. Every man, whose eyes are constructed upon common principles, has discovered something in the habits and character of the class of vertebrated animals we are considering, which is of real consequence, but unless more disposition is manifested to concentrate observations, it will be a long while before we shall have embodied, any correct views of the reptiles or fishes of the New England States.

Strange as it may appear, the first land settled by our European ancestors, as profusely peopled with these tribes as any section of the American Continent, is the least known to men of science.

FAMILY I. — SALMONIDES.

In this family, the body has scales; — there are two dorsal fins, but the second is flexible, in consequence of being destitute of bony spines.

GEN. SALMO.

Salmon, — *Salmo Salar.* The upper jaw is larger than the lower, and in the males the under jaw is curved upward. The back has a bluish shade, the sides are silvery white below; and above the lateral line, are irregular, dark spots. On the tongue, which is white and cartilaginous, are teeth; and the scales are striated.

So perfectly well known is the salmon, that it is quite needless to enter into any further details than those which relate to the salmon fishery, or tend to illustrate the character of this highly valuable tribe.

Probably the Connecticut has been more distinguished for this fish, than any other river in Massachusetts, but they are becoming more and more scarce, from year to year. Locks, steamboats, the common business of navigation, and above all, increasing settlements, conspire to interrupt the progress of the salmon towards the head waters.

Still, however, they overcome great artificial obstacles, such as dams, &c. by their muscular dexterity, which would almost discourage the persevering industry of man.

Formerly, in the month of April, they passed up the Connecticut to its highest branches, leap-

ing cataracts, where the weight and velocity of the water was to be overcome by the instantaneous exertions of the muscles of the tail. They have been sometimes seen to make several attempts, before they succeeded in ascending the fall.

While running up rivers, they are fat and delicious food, from May till the last of June; after that period, having deposited their spawn, they return to the sea, lean and emaciated.*

The St Lawrence has yielded immense supplies, but they are decreasing, gradually, in a ratio corresponding with the increase of population. In very hot weather, they are extremely annoyed, while in salt water, by an insect, burrowing in the skin, called the *salmon-louse*.

On old salmon they have been so numerous as to kill them. The fact is well established, that solitary salmon run up rivers, as the seine-men say,

* Wm. Ladd, Esq. of Minot, Me. addressed the author the following note.

"Some years ago, Governor King, of Maine, showed me a phial containing the roes which had been taken out of a salmon, caught at sea, late in the autumn. They were about as large as peas. He informed me that a fisherman had brought him the spawn to convince him that the salmon did *not* spawn in our fresh water rivers, but followed the fishes that did, for the sake of their spawn. The Governor, and all the rest of the company, appeared to be convinced that the salmon do not spawn until after they leave our rivers."

out of season; that is, come back the last of September and October, and for the purpose, it is thought, to rid themselves of their troublesome associates, which are known to die as soon as the fish has been a few days in fresh water.

In the rivers of Kamschatka, they are numerous beyond all example, — even blocking up the small rivulets into which they wedge themselves, in trying to pass by the untold thousands on the route. Such multitudes are thrown upon the banks, by the pressure of the moving armies, and left to die, that were it not for bears and dogs, their bodies would create a pestilence. Such is their antipathy to, or fear of everything red, that before they can be caught successfully, in the rivers of this country, the fishermen are said to divest themselves of their red caps and shirts.

Captain Charles Kendall, a respectable and intelligent navigator of Boston, assured us that when on the northwest coast of America, within a few years, he stood in a small stream which came leaping down the crags of a mountain, in which these delightful fishes were urging their way in such astonishing crowds, with hardly water enough to cover their backs, that he stood with an axe, and killed hundreds of them as they passed between his feet.

He saw birds of prey dive down from the long

branches of trees that waved over the waterfalls, and pick out the eyes of several at a time, before they flew back to their resting place. Jewett's travels confirm his statement.

To those who are not particularly conversant with the natural history of the northwest coast, as given us by veritable travellers, the foregoing account may appear overcharged, but it is substantiated by all the voyagers who have remained there any length of time.

The salmon is found on the coasts of Europe, from Spitzbergen, quite to Western France, says a writer in the Conversations Lexicon, but is never seen in the Mediterranean. On the western shores of the Atlantic, it is found from Greenland to the Hudson, but is exceedingly rare in the latter river, and never penetrates farther south.

They also abound in Eastern Asia, where, as well as in the United States, they grow to the weight of ten or fifteen pounds, and often four feet in length, in the clear, cold rivers of the north.

As the ice melts away in the spring, they rush to the rivers, from the ocean, and it is an undeniable fact, confirmed by successful experiments, that they visit as far as possible, the very streams in which they were born. Usually, when undisturbed, they swim slowly in immense bodies, near the

surface, yet they are so timid, that if suddenly frightened by a great splashing in the water, the whole column will turn directly back towards the sea.

It has also been proved, by actual calculation, that a salmon can scud at the surprising velocity of thirty miles an hour. The young are about twelve inches in length, when they visit the sea for the first time. After the parent fish have passed up the rivers, the spring following, the young ones follow at a respectable distance, having grown about six inches.

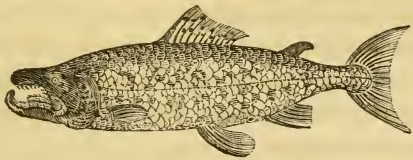
At the end of two years, they weigh five, six and seven pounds ; and at the expiration of six years they have attained their ordinary dimensions. A few of these fishes are carried to Philadelphia, but the Boston and New York markets are supplied, principally, by the packet-men from the State of Maine.

The Salmon Fishery of Newburgh, on the river Tay, in Scotland, once produced a net rental of seven thousand pounds sterling per annum. Very numerous small fisheries on the same river, belonging to small proprietors, pay three hundred pounds annually.

On the river Ness, in Scotland, the Salmon Fishery has risen in value, in eleven years, from two hundred to twelve hundred pounds a year.

Salmon are known to change their haunts; in many rivers in which they were formerly so abundant, that "*farmer's servants stipulated to have them only twice a week as food*,' not one is now to be found.

THE SALMON.



They were formerly abundant in the Thames, and caught in great numbers, but since the introduction of steam-boats on this river, they are rarely to be found.

In some rivers of England and Wales, at the season when the salmon and their fry return to the sea, the quantity taken in one week has exceeded thousands in a day, and in some instances in such quantities that they were given to the swine.

At Leixlip, in Ireland, is a very high cataract, called the Salmon-leap, from the number of these fish which are to be seen leaping it, in the season when they return up the river to spawn. In fine weather, says a friend, "*I have*

seen them springing up these falls by scores, and rarely have seen one miss its aim."

The otter is a great destroyer of these fish, and is a perfect epicure, after catching one, — he only bites out a piece between the head and the shoulders, and leaves the remainder. "I have seen," "says the same gentleman, "ten or twelve dead salmon floating down the river Tay, in the highlands of Scotland, in one morning, all of which had been bitten in this way by the otter, and what is very remarkable, these fish are always fat and in prime condition.

"Many of the poor cotters residing near the streams and rivers of the highlands of Scotland and Wales, subsist, in a great measure, in the season, upon these fish, which they pick up early in the morning, as they float down the stream from the otters' haunts."

Salmon Trout, — *Salmo Trutta.* As we have particularly devoted a considerable number of pages to the subject of angling, in which a reference is made to all the varieties of the fresh and salt water trout, known to the naturalist or the scientific angler, in New England, it is our apology in this place, for not being more minute and elaborate in the following description.

Nothing, therefore can be more perplexing than attempting a classification: they have one com-

mon origin, — are all descendants of the same parents, but by living in different places, the one is large, another small, — another spotted, and another tinged with gold.

This fish has brown spots, some of which, on the upper portions of the body, are surrounded by a beautiful bright halo, of a semi-metallic lustre. On the sides and abdomen, a silvery hue predominates. Even when cooked they may be known from the exclusively fresh water trout, by the redness of the flesh.

It is caught at the mouths of rivers and small streams communicating with the ocean, but as it cannot endure the extremely salt water, there are few good localities for them on the line of this state. The salmon trout has so much the appearance of the salmon, and so much resembles it in character, that the description which has been given of one, very nearly describes the other.

Allusion is made to this fish in the Salmonia, as affording considerable sport, but we do not possess the faculty of interesting the mere sportsman, an attempt at which, after a man so eminently distinguished as the author, would be downright absurdity.

Common Trout. — *Salmo Fario.* There is not a river, nor running stream in the northern

states, which has not the *common trout*, as it is called, by every body, and yet, on examination, the external characteristics are as different as possible; but the difference consists in the arrangement of spots and color, rather than in the organization of the branchiæ or disposition of the fins. If we go to the lakes, still farther to the north, they also have the *common trout*, which, compared with the river trout, are codfish by the side of minnows. This difference in complexion and size, is brought about in the opinion of the learned author just quoted, by the quality and quantity of food, the water, &c.; — these developments, whatever they may be, "are transmitted to the offspring, and produce varieties which retain their characters as long as they are exposed to the same circumstances, and only slowly lose them."

FRESH WATER TROUT.

Plenty of good food gives a silvery color and round form to fish, and the offspring retains these characters. Feeding much on larvæ, and on shell-fish, thickens the stomach, and gives a brighter

yellow to the belly and fins, which become hereditary characters."

Like the adult children of one family, one is tall, another is a dwarf, a third is fat, a fourth has a dark complexion, a fifth has red hair, a sixth blue eyes, — the seventh excellent front teeth, — the eighth good grinders, but imperfect incissors, the ninth is lean, and the tenth differs from all the rest — and yet they sprang from the same parents, — the same blood circulates in their veins, at one table they subsist on the same food, — and still no two present the same external character, but why they do not, is a mystery wholly beyond elucidation; such is precisely the case with the fresh water or semi-marine trouts.

England is famous for its trout, and for the variety too, but after all, we have in the United States an equally imposing catalogue, under different names.

But to the point; — the *common* trout of Massachusetts is from eight to twelve inches long, — dotted on the back, with brownish spots, — shaded by a paler circle. On the gill covers is a broad spot; the under jaw is the longest; the soft rayed fins tinged with yellow, and on the sides of the body are red spots.

Hunchen Trout, — *Salmo Hucho*. Resem-

bling very much the sea-trout, it is found, on careful inspection, to be more slender, and to have a greater number of red spots. The back is dusky; the ventral fin has a yellow tinge; all the others are of a palish purple.

The tail is forked, and the fish measures sometimes four feet, though, ordinarily, it is only about two, and caught by the hook. This trout certainly exists in the large rivers and ponds in the interior, but deteriorated in size. They are brought from New Hampshire, in the winter, frozen for the markets; and from the northern parts of Maine, where specimens have been taken, large as any produced in the great rivers of Europe.

We subjoin an extract from the Salmonia, touching the hunchen or huco trout, with the belief that it will lead to further investigation.

"The hucho is the most predatory fish of the salmo genus, and is made like an ill-made trout, but longer and thicker. He has larger teeth, more spines in the pectoral fins, a thicker skin, a silvery belly, and dark spots only on the back and sides. I have never seen any on the fins. The ratio of his length to his girth, is as 8 to 18, or, in well-fed fish, as 9 to 20; and a fish, eighteen inches long, by eight in girth, weighed 16,215 grains. Another, two feet long, and eleven inches in girth, and three inches thick, weighed four pounds two oun-

ces and a quarter. Another twenty six inches long, weighed five pounds and five ounces.

"Of the spines in the fins, the anal has nine, the caudal twenty, the ventral nine, the dorsal twelve, the pectoral seventeen: having numbered the spines in many, I give this as correct. The fleshy fin belonging to the genus is, I think, larger in this species, than in any I have seen.

"Block, in his work on fishes, states that there are black spots on all the fins, with the exception of the anal, as a character of this fish: and Professor Wagner informs me he has seen huchos with this peculiarity; but, as I said before, I never saw any fish with spotted fins, yet I have examined those of the Danube, Save, Drave, Mur and Izar; perhaps this is peculiar to some stream in Bavaria, yet the huchos in the collection at Munich have it not. The hucho is found in most rivers, tributary to the Danube, — in the Save and Laybach rivers, always; yet the general opinion is that they run from the Danube, twice a year, in spring and autumn.

"I can answer for their migration in spring, having caught several in April, in streams connected with the Save and Laybach rivers, which had evidently come from still, dead water, into the clear running streams, for they had the winter leech, or louse of the trout upon them; and I have seen

them of all sizes, in April, in the market, at Laybach, from six inches, to two feet long; but they are much larger, and reach thirty or forty pounds.

"It is the opinion of some naturalists, that it is only a *fresh water fish*, yet this I doubt, because it is never found beyond certain falls — as in the Traun, the Drave and the Save; and there can be no doubt it comes into these rivers from the Danube; and probably, in its largest state, is a fish of the Black Sea.

"Yet, it can winter in fresh water, and does not seem, like the salmon, obliged to haunt the sea, but falls back into the warmer waters of the great rivers, from which it migrates in spring, to seek a cooler temperature and to breed. The fishermen at Gratz, say they spawn in the Mur, between March and May. In those I have caught at Laybach, which, however, were small ones, the ova were not sufficiently developed to admit of their spawning in spring."

We think there cannot remain a shadow of doubt, after comparing these notes, with the great trout of the cold ponds in Maine and New Hampshire, as well as with the degenerated representative of the family in the rivers and ponds of Massachusetts, that they approximate the true hucho of the Danube. It is very certain, too, that by be-

ing kept entirely from the ocean, it improves both in flavor and magnitude ; this, however, secondarily, depends on the extent of the ponds.

We cannot but express our astonishment that gentlemen owning estates on which there are fine basins of water, do not stock them with trout, which can be as easily done, as they can stock their lands with cattle and horses, and they can be as choice, too, in the quality; Surely, in this country, it is yet an untried source of domestic economy.

GEN. OSMERUS.

Smelt, — *Osmerus Eperlanus*, called also *Sparling*. Were not every body familiar with this beautiful little fish, it would be worth while to dwell on its character and biography, more particularly than will be attempted. Under the microscope, the skin is so exceedingly delicate, that the circulation of the blood may be seen, coursing its way through the cutaneous vessels.

There have been writers who consider the smelt as the fry of the sea-trout, and others, the young of some other fish of greater size ; but after all, the smelt very certainly remains the same from year to year. The smelt of Massachusetts resembles that of Europe, but still, there is a variation in the number of rays in the fins.

At the south, there is a variety, called *menidea*, which has twentyfour rays in the anal fin. In the month of March and April they cast their spawn, after which they seem to stretch out into the ocean, till the approach of autumn, when the harbors swarm with them. They pass into rivers and creeks, but the borders of the salt water is their peculiar residence, and where they are caught through the winter, or indeed, in all inlets, where the sea-water sets at high tide, in immense quantities.*

An attempt has been made to climate the smelts in a fresh water pond, but they have soon degenerated, becoming at first emaciated, and disappeared, by degrees, till they probably all died.

FAMILY II.

CLUPEA.

One of the distinguishing characters of this family is, that they are destitute of an adipose fin; the upper jaw is formed in the middle by intermaxillaries, without pedicles. The body is scaly — and they have besides, the air-bladder and cæcums; the branchial arteries are furnished on the side next to

* We are inclined to the opinion that smelts shed their scales annually, in the month of March.

the mouth, with comb-like teeth ; on the under edge of the body the scales form a serrated ridge.

Common Herring, — *Clupea Harengus.* Head and mouth compressed, — the latter, rough, within ; jaws short and unequal ; — the upper one having serrated mystaces, short tongue, quite rough : — inverted teeth, eyes round, gills setaceous ; gill covers sometimes of three, and sometimes four plates ; gill membrane eight rays ; — body somewhat compressed, and covered with small sized scales ; ventral fins commonly with nine rays ; the tail forked.

The name *herring*, is derived from the German word *heer* and *army*, in reference to the migration of herring, in such astonishing numbers, as to excite the wonder of both ancient and modern naturalists.

In the United States, herring are taken in large quantities, but the kind peculiar to Massachusetts particularly, seems to be the clupea harengus, (*pseudo*), — though most of the varieties found in Europe, are also recognised on the atlantic shore of North America.

The common edible herring of this state, *haren gus*, is of an ash color, — approximating a greenish blue : the belly and sides have a silvery hue ;

under jaw a trifle the longest; — head quite small. When cured, they are unfortunately considered inferior to the European. But this is a mistake, founded on prejudice.

The herring of this country, carefully preserved, is no wise inferior to those of other countries. They are caught in variously constructed nets, in most of the rivers and fresh water streams, which are so connected with the sea that the tide water sets several miles up their channels.

This tribe of fishes, so far as regards number, if we credit the assertions of writers, very much exceeds all others put together. In the northern seas, inaccessible to many other beings, they have an oceanic metropolis of their own, where they multiply beyond all human computation.*

Nature seems to have created them expressly to become the food of the many monsters of the deep; as bread is the staff of life for man, so are herring the food on which the unnumbered creatures of the sea mainly depend. It has been computed, that if a single herring were permitted to

* Pennant's idea of the migration of herring, to the Polar Sea, is generally questioned by writers since his day; but circumstances to which it is unnecessary to allude here, in conjunction with the testimony of navigators, in our humble opinion, amply sustain his assertions.

multiply in its characteristic manner, together with its offspring, for twenty years, their united bodies would ten times exceed the bulk of our globe!

Although this may be considered a wild calculation, resting, however, on the authority of a foreign calculator, there is probably a nearer approximation to truth, than we are ready, at first view, to admit.

Herring are certainly anadromous, though their migrations may have been over-rated. Their taking, it is said, the regular circuit of the sea, gives additional interest to their history. One immense army leaves the polar regions, in the spring, equalling in extent the whole surface of Great Britain.

As they advance, squadrons begin to separate from the main body; these average from four to six miles in breadth, — and in length, cannot be measured by the eye. An astonishing representation arrives at the Shetland Islands, in June. By September, England, Ireland and Scotland, are surrounded by them. From these parts, the forces move southwest, — cross the atlantic, and make their appearance on the coast of Georgia, about the last of January; detachments then begin to move eastward, till, ultimately, the whole North American seaboard is lined with them.

When the length of sea-coast bordering the United States is recollected, — about three thousand

miles ; — and it is also considered that millions and millions are annually taken by the fishermen ; — and in connexion with these facts, it is admitted that thousands are swallowed at a mouthful by whales, — several species of which follow the herring in all its migrations, to destroy it ; — the havoc made on their phalanxes by other fishes and marine monsters, — and yet their numbers appearing undiminished ; — with all these facts, can any man in his senses, doubt for a moment, the relations of naturalists.

In direct opposition to the foregoing remarks, the migratory character of the herring is questioned by some very late writers, who suppose it remains through the winter at no great distance from the shore, or plunges into the deepest parts of the ocean, or burrows in the mud, to rise at the spawning season. All this appears both unphilosophic and irrational.

In the first place, herring are rarely caught at sea, unless a shoal, pursued by a whale, drives them out of their course. Moreover, it has been asserted, that wherever found, they invariably keep at a certain distance from the sun.

Secondly, they have not the organization for living in mud or filth of any kind. Thirdly, they are physically prevented from sinking into very deep water, by the structure and development of

the air-bladder. Their very form, viz. — sharp body, flat head, broad fins, and large air-sack, shows most clearly that they were designed to run near the surface, and to be always in motion.

We have therefore, much more confidence in the relations of the old writers, on this subject, than in modern upstart theorists.

Herring are supposed to feed on sea-worms, and the young fry of such fishes as come in their way. When taken from the water, they die instantly, hence the vulgar proverb — "*dead as a herring.*"

The herring fishery, as a source of industry and wealth, has long since, in various kingdoms of Europe, been considered of national importance. From the last of June till late in November, they contain roe; but after that period, begin to deposit their spawn, and are then considered less wholesome, and less valuable.

This fish, variously prepared, has been esteemed, as an article of food, from the remotest antiquity. Holland, particularly, was the country in which they most excelled in this fishery. Many years since, it was supposed that rising of 150,000 persons, were devoted solely to the trade of taking and curing of herring.

One Guillaume Beuchel, a native of Brabant, in

the fourteenth century, discovered a mode of pickling them, which was considered so remarkable, and of so much importance, that the Emperor Charles V., one hundred and fifty years afterwards, *honored his grave with his royal person, and ate pickled herring on the green grass that waved above his bones !*

Some idea may be formed of this branch of industry, abroad, by the following relations, viz.— Yarmouth, in England, is the herring mart of Great Britain, at which place, upwards of sixty thousand barrels are annually caught and cured.*

We are credibly informed, that eighty years ago, four hundred thousand barrels were annually exported from different parts of Norway. Sweden exports the *oil* of *herring*, to the quantity of sixty or seventy thousand barrels yearly. This fishery has been often called the Dutch Gold

* By the corporation charter of the city of Norwich, England, the Mayor has to present to the King annually a herring pie. This custom is necessarily practised up to the present day. The pie has a standing crust, modeled in exact representation of Norwich Castle, and filled with herring.

The origin of this clause in the charter, arose from the fact, that the city, many centuries ago, now many miles inland, was the port to which the fishermen brought their herring, caught on the coast, but in consequence of the sea receding and new land forming, Yarmouth has grown into existence, and now become the port to which the fish are brought and cured, and Norwich has become an inland city.

Mine, in allusion to the riches that nation has drawn from it.

The law has been so well observed, as it respects the curing and packing, in that country, that their reputation has given them almost the complete control of foreign markets.

The late Dr Mease, of Philadelphia, considered the subject of the herring fishery of such national interest, many years since, that he abridged a pamphlet written by the Earl of Dundonald on the subject, with a hope of awakening the people of the United States to a realizing sense of the inexhaustible source of wealth the ocean presented in the herring fishery.

The Dutch law obliges the fishermen to separate the herring caught in one night, from those taken in another. None are allowed to be shipped after the 15th of July. No herring are to be sold on any consideration, till they have remained ten days in pickle : — and the law also compels the fishermen to complete the curing process within three weeks after they arrive in port, and lastly, to repack them. Salted in barrels — four barrels of salt are to be put to every twelve of fish. The law even says they shall be packed alternately, *lengthwise and crosswise;* and lastly, no salt but such as actually comes from St Ubes, shall be used.

The laws both in England and Scotland, as they regard the packing and sale, are exceedingly strict, and even vexatious.* Massachusetts has enacted many laws, from time to time, on the same account; but the Legislature has been particularly distinguished, in imitation of the mother country, for enactments for the *preservation of species*, as though the race were in danger of being exterminated, unless immediately protected by the conservatory powers of the General Court.

In Portugal, in order to encourage the rearing of cattle, the law forbids the killing of calves — or the sale of veal; and further declares that eating eggs, is really detrimental to the raising of poultry! With a degree of wisdom, worthy of Portugal, the English Parliament ordains that a ship of war shall cruise among the fishermen on the coast of Scotland, to preserve the breed of herring! The duty of the officers is specially to inspect the nets, and to seize such as have meshes less than one inch square, — the object of the law being intended to allow the little young ones to make their escape! In the "Philosophical Transactions" for 1767, it is clearly stated, that the average number of eggs in a herring, is 36,969.

* Appetits are half-cured herrings, prepared in France. They are also called bouffees, or swelled herrings.

It is needless to advert to the many laws enacted by the Legislature of this Commonwealth, for the protection of the *alewives* in Taunton Great River; as well as other species of edible fish, peculiar to the rivers directly communicating with the sea-board.

Such laws have never been, nor can they be, of the least possible advantage; the combined forces of the United States, in battle array, could not lessen their apparent numbers, — and it would be utterly impossible to exterminate the species.

Therefore, all such protecting laws are perfectly useless, unphilosophical, and at variance with that grand scheme of nature which provides for the necessities of all organized beings, and sustains the existence of their species, under all changes, incidents and circumstances.*

Such portions of the fishery laws as immediately affect the process of curing, and punishes frauds in the weight and sale, are both reasonable and righteous.

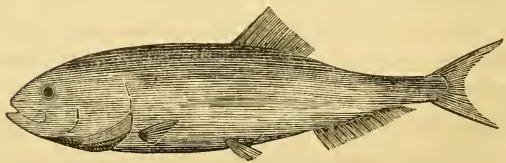
Dams, break-waters, &c. across rivers, are the results of civilization, and fishes may forsake the streams where they once instinctively deposited their roes: —but their loss is trifling, at any particular locality, when compared with the advanta-

* Du Cange mentions *aquatia*, the right of fishing three days in the year, in the middle ages.

ges arising from the improvements of their solita ry haunts. As animals recede before the inroads of civil life, so do the fishes, and no human laws can restrain them.

Menhaden, Bony-Fish, Hard-Head, Mars-banker, or Pauhagen, — *Clupea Menhaden.* All these mean the same fish. Perhaps the best history of the menhaden, is that by Latrobe, in the fifth volume of the Philadelphia Transactions. The great whale, Balæna Mysticetus make them a favorite food.

THE MENHADEN.



Dr Mitchell was informed by whalemen, that when this monster gets into a shoal of menhaden, his under jaw being spread, he gathers in several hogsheads at a mouthful, which can only enter the small swallow of the whale, one by one. In the various bays and inlets of Massachusetts, such vast shoals of the menhaden are taken, that besides being smoked for food, far greater numbers are distributed over the fields for manure.

From July to the last of August, the borders of the sea swarm with them. Lynn Bay, particularly, is said to be a favorite place of their resort.

The usual length of the menhaden, is from ten to fourteen inches; gill cover large; one blackish spot on the neck, quite near the operculum; tail forked; belly serrated; back arched; mouth and tongue destitute of teeth; color dusky, having a slight shade of green; gill membrane eight rayed.*

As before remarked, the menhaden, amongst the older class of fishermen, towards New Hamp-

* On a fine sunny sabbath, in 1831, a servant picked up a very large *pauhagan*, in a gravel walk, at the top of a hill, near the author's house, which was actively thrashing about the small stones with its tail. He brought it into the kitchen — but in the course of his own examination, however, before he arrived, it appeared to be dead. It was severely wounded in the side, as though it had been stabbed through and through with a bodkin. Being put in a pan of water, to be washed, it so happened that our attention was called another way, for an hour or two, but to the great surprise of the house, the fish was swimming about as well as the dimensions of the vessel would allow. The same fish is now in our collection. In the course of an hour, the servant discovered that a fish-hawk was perched on a signal staff over the very spot where he picked it up, with another in its talons. This explained the mystery of its visit on dry land. Probably the hawk inadvertently dropped it, only a few moments after it was caught. They are commonly used for bait in the inshore cod-fishery and not for food, when fresh.

shire and Maine, bears the Indian name of Pauhagen, which it has been suggested in the notes upon "*gadus tom-codus*," is the aboriginal appellation. Yet the New York icthyologist expressly says that *menhaden* is the name by which the aborigines called "*him*." Notwithstanding this declaration, we have good reasons for supposing that *menhaden* is a corruption of *pauhagen*. However, the origin of the name is of little consequence, and therefore, we resign the field to those who may have more leisure for the investigation.

Shad, — *Clupea Alosa*. This has a sloping head; body tapering towards the tail; under jaw longer than its fellow; teeth small and sharp; dorsal fin nearly in the centre, — the middle rays the longest; pectoral and ventral fins quite small; abdomen sharp and serrated; tail forked; back a dusky blue; — has a line of dark spots on each side; varying from four to ten. Another, called the American shad, *clupea capadissima*, is without spots; — has large scales; snout not cloven.

The shad is a valuable fish, always commanding a ready market in New England. It bears so much resemblance, in general conformation, to the herring, as to be called by the fishermen the *mother of herring*. They are taken in surprising quantities, in most of the rivers visited by the herring.

Though strongly resembling that fish in outward appearance, it grows very much larger, — being generally more than a foot in length, but flat and broad. On the northwest coast of America they are inconceivably numerous.

The average weight is from five to eight pounds, in the true fishing season. From the last of April to the early part of July, they are ascending the rivers for the purpose of depositing their spawn. Among epicures the roes are considered a delicacy, far superior to the fish itself. The price they sometimes bear in the market, before they begin to run, is truly enormous.

This fish, as well as many others of the family to which it belongs, is organized for breathing either fresh or salt water, though it seems it cannot propagate if confined exclusively to either. In most of the rivers visited by the herring, the shad is successfully taken, in large nets, supported on the surface by a series of buoys.

The shad fishery of the Connecticut river, has been a source of great wealth and prosperity to the proprietors on its banks, from Saybrook far into the interior of Massachusetts. Many years since two hundred and ninetysix seines were counted, between Saybrook and Hartford;— it is probable there were a number farther up.

One man remarked that he once caught thir-

tysix barrels of shad, at his locality, at one haul. Some idea may be formed, from these statements, of the incredible number which were annually taken in the Connecticut in former times. All the smaller rivers have their quota, in the fishing season.

The Merrimac, Medford, Connecticut, Neponset, &c., are amongst the principal rivers in Massachusetts, in which this fish was taken in such quantities as to make the fishery a decidedly pecuniary object.

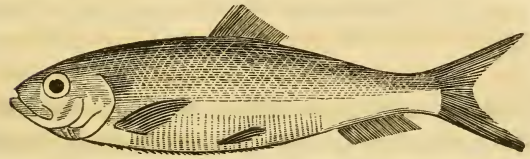
Alewife, — *Clupea Vernalis.* This fish seems to hold a place between the shad and herring, having the general characteristics of both. Its habits bear a striking similarity to those two fishes, inasmuch as it ascends rivers to deposit its spawn, and retires again to the ocean.

Although caught in vast abundance at many places in the Commonwealth, Taunton river has been the most distinguished for the alewife fishery. Judge Davis informs us, in an obliging note, that the "alewife," or, as our laws very carefully express it — "*fish called the alewife*," is doubtless of the genus clupea.

In the list of New England fishes, in the third volume of Dr Belknap's History of New Hampshire, it is denominated *clupea serrata.* In the

preparation of that list, the late Rev. Dr Cutler was consulted, and we believe Professor Peck, also. The specific names of three of the genus

THE ALEWIFE.



clupea, are inserted in a different character from those, whose specific names had been previously established: Serrata is one of the new names. The common name is so universal, and of such long standing, that the usual adjunct, "*so called*," may well be omitted. "It is derived, probably, from *Alosa*, the specific name of its congener, the shad."

"I have been led to think that the term *alewife*, applied to this fish, was framed by our ancestors, — having reference to the shad; especially as the Plymouth Pilgrims had heard of it in Holland, and by the old English term, *oldwife*. It is, I believe, a fish peculiar to our country: the streams in and about Plymouth, are full of them, in their season."

There is no inlet of fresh water, to the sea, vis-

ited by the shad and herring, that is not also the resort of the alewife. Vast quantities are pickled, smoked, &c.both for home and foreign consumption.

It has been suggested, that *alewife* is derived from the " Indian word *aloof* — signifying a bony fish.

Bret, or Brit, — *Clupea Minima.* Probably this is the fish mentioned by Dr Belknap. It is very small and delicate, seldom exceeding more than one inch and a half, having a black back, and silvery scales on the sides. The median line is straight, and near the spine. The pectoral fins are large, made up of ten rays, — flexible, like a brush, and near the gills. Ventral fins three — two posterior to the vent, and a single one near the tail.

There is but one dorsal fin, directly opposite the posterior ventral: the caudal contains from fourteen to eighteen soft rays; gill cover in one broad plate, having a line that, at first sight, appears to divide it into two pieces.

The eye is full, and the under jaw a little the longest. Although this appears like a fish in miniature, it is very beautiful. Prepared as the anchovies are, there is every reason to suppose they would be equally prized for the table. Shoals

of them are driven about by the mackerel in July and August.

FAMILY III. — ESOCES.

GEN. ESOX.

COMMON PIKE, — *Pickerel, Esox Lucius.** With a few exceptions the body has an olive shade, considerably dark on the back; but the sides, in particular positions, show waving lines, delicately mottled with dark spots. The under jaw is a trifle the longest. All the intermaxillary bones, palate and tongue, are studded with minute teeth; some of them, however, bordering the edges, are considerably developed.

THE PIKE.

It has but one dorsal fin, directly opposite the anal, and both have thirteen rays. In this country, as in Europe, it varies from six inches

* In England young pike are called *Pickers*, when half grown *Jack*, and at full growth, *Pike*.

to several feet in length, and is taken in the rivers, lakes, &c, throughout the United States. In Massachusetts it rarely exceeds two feet.

Their digestive machinery is quite curiously constructed. When young, in England, measuring about one foot, they are called Jacks. When of this size they are splendidly shaded with green and yellow spots; as they grow older, however, the brilliancy of the coloring is lost, and they even have a dingy hue — and in extreme age, become of a metallic complexion. Young water-fowls, frogs, and indeed every living creature which they can master, they never hesitate to seize upon.

They are usually caught with a bait made of a small fish. The flesh is white and nutritious, and on the whole, it is one of the best table fishes in New-England, but only a comparatively small number find their way to the Boston market. In the western part of the state they occasionally attain the length of two feet and a half.

Dr Williams, author of the History of Vermont, informs us that the pike in that state bears the name of *muschilongæ*. Lake Champlain abounds with them, of immense size and length. The Doctor says they are easily speared, a common mode of taking them all over New England.

From the lakes, specimens are produced, weighing forty pounds — and six feet long.

The pike of this country does not differ, essentially, from the pike of Europe. If there is any difference, it is solely referable to the color, which we have remarked, varies with the age, and probably too, with the quality of the water in which they reside.

This fish, when well grown, seems to delight in clear water, near some stone or root, where it will remain hours together, if not frightened; in this situation, it is a common sport to shoot them with a rifle.

In illustration of their voracious character, we have selected the following facts from different authors.

In Germany, a mule, in the act of drinking, at a river, was seized by a huge pike, which fastened on its nose, and nearly succeeded in drowning the poor beast. Though the mule, by struggling, aided by the driver, got its nose out of the water, the pike kept its hold and was drawn on shore and killed. A little girl, not many years since, in dipping water from a pond, was attacked by one of these violent creatures, which dreadfully lacerated her arm.

They not only become extremely despotic in

ponds, destroying all other fishes, frogs, &c. — but under circumstances of hunger, swallow each other. Pennant mentions an instance of one that was actually choked to death, in trying to swallow one of its own species.

This is an unnatural trait of character, it being an exceedingly rare occurrence that any family of animals feed upon its kindred. Male crocodiles destroy the young ones when they are first hatched, and so do sharks and swine, but such an act seems to depend upon constitutional circumstances which we are unable to explain. Even water rats, are driven away from the pike waters.

According to Block, it increases more rapidly than any other fish with which we are acquainted. In the first year, it grows, in Europe, from eight to ten inches; in the second, from twelve to fourteen; and the third year, to eighteen or twenty.

It is inferred that they are very aged, when they arrive at the amazing length of six feet, a circumstance by no means uncommon, in the northern lakes, in England, Germany and Poland.

Rzaczynshi mentions a pike that was ninety years of age; and Gesner relates, that one was taken near Hailbrun, in Suabia, in 1479, with a

broken ring attached to it, importing that it was placed in the lake in 1230 — giving it the wonderful longevity of two hundred and fortynine years. The very ring is still kept at Manheim.

Many years since an old pike siezed the head of a swan, in Lord Gower's canal, and gorged so much of it, that both the fish and the majestic bird were killed. Combats have been witnessed between two of them.

In a well stocked pond on a gentleman's estate, in England, one single pike, in about one year, became sole lord of the water, having completely devoured every fish.

The pike-ponds of Poland have been sources of immense profit, in former times, to the proprietors, and might be so in the vicinity of any of our large towns. One acre of poor land, turned into a pond, and stocked with pickerel, would yield more income to the owner, than the produce of six acres of cultivated land.

We entertain the hope that some attention will be paid to this sure source of domestic economy, by the Horticultural Society of Boston, — who by offering premiums, might bring this delightful fish in considerable plenty, into our markets.

There have been several laws enacted, from time to time, by the Legislature of Massachusetts, for protecting pickerel, and specifying the time

when it may legally be fished for. Nothing can be more absurd than the whole course of legislation on this subject. Look at the statute book, and the reader will find as many unphilosophical and absurd restrictions, on man's natural propensity for angling, as ever were printed; and manifestly at variance with the design of our Creator. No other confirmation of this remark is necessary, beside the total disregard in which the edicts are held by all classes of citizens.

The money which has been actually expended in legislating on the "*Alewives in Taunton Great River*," would have constructed a monument of their bones, as high as the incipient granite memento on Bunker Hill, which would have been more marvellous, and decidedly of as much utility as anything the operation of the laws have effected for the *Taunton Great River alewives*.

The fisheries in China are free to all; there are no restrictions on any of the great rivers, lakes or canals. The subject of the protection of the fisheries is not once mentioned in the *Leu-lee*, but the heavy duties on salt, renders the use of salt fish, in China, an article of food almost unknown: beside nets, the line, and spear, the ingenious people of that country have a peculiar method of fishing with the Cormorant, *pelicanus piscator*, which extends all over the empire. The bird is taught

while young, to dive for the fish, which it would greedily swallow, were it not for a metallic ring slipped over the neck, which holds the fish in the throat, so that the man in the boat, pulls it out and suffers the bird to dive again.*

The cormorant will catch bushels a day, in this manner, being taught to swim towards its master, to deliver the burden. In other parts, it is a very common practice, to take fish by torch light, as is practised in spearing eels, suckers, &c. in the interior of New England. But they have one more curious and successful mode, which does not seem to have been copied anywhere, which is this: — a white painted board, highly varnished, is fixed along the outside edge of the boat, with another inside, so that both are like the roof of a house. In moon-light, the board reflects the rays into the water, in such a manner, as to induce the fish to spring toward it, supposing it a sheet of moving water, and thus they fairly leap over the ridgepole into the boat.

The boldness and voracity of the pike are so extraordinary, that it may with propriety be term-

* Oviedo Gomaro, as well as other writers, have testified to the fact, that the Indians of the Antilles, had the art of taming a species of sea-fish, and employed them in pursuing others. Its size was small, and in their dialect, called *guaican*, and by the Spaniards, *reverso*. Mr Clinton says Oviedo explains the manner in which they conducted the process.

ed the river shark. Instances have been known of its seizing the hands of people who attempted to grasp them while in the water; — of their devouring fish whose size was nearly equal to their own; — and shortly after yielding to the temptation of the angler; and that, even while their intestines were lacerated and corroded by hooks and wires, which they had previously broken and swallowed.

A single large pike has sometimes depopulated, in a very brief space, a well stocked pond, where it was permitted to commit its ravages with impunity; — and not confining its attacks to the inhabitants of its native element, has drawn ducks, and other water-fowls under, which had incautiously ventured within reach.

This fish is no less remarkable for its tenacity of life, after being removed from the water, than its vigor while in it — snapping at objects presented to it for a long time after it is caught, with as much eagerness as if it were still at liberty.

A gentleman was once angling for pike, and succeeded in taking a very large one, at which time he was encountered by a shepherd and his dog; he made the man a present of the fish, and while engaged in clearing his tackle, he saw the dog, who had for some time been expressing his satisfaction by the most unequivocal signs, seat

himself unsuspectingly with his tail at a tempting proximity to the jaws of the pike, which suddenly caught at it.

It would be impossible to express the terror of the dog, on finding such an appendage thus en-*tailed* upon him — he ran in every direction to free himself, but in vain, and at last plunged into the stream as a last resource,— but this was equally fruitless. The hair had become so entangled in the fish's teeth, that it could not release its hold; accordingly, he struggled over to the opposite side, now above, and now below the surface.

Having landed, the dog made for his master's cottage with all haste, where he was at length freed from his unwilling persecutor; yet, notwithstanding the fatigue the latter had endured, he actually seized and sunk its teeth into a stick which was used to force open its jaws.

The pike lives to a great age, and attains an uncommon size, if unmolested. One of the largest probably ever taken, was found on drawing a pool near Newport, England, that had not been fished in for many years; its weight was over one hundred and seventy pounds. Another was taken in Lough-Carrib, Ireland, weighing over seventy pounds. In Persia, they attain a greater size than in any other country.

Pike spawn in March or April. During the height of the season their colors are extremely brilliant, being green diversified with bright yellow spots; at the close of the season the green fades to a greyish hue; and the yellow spots become faint and indistinct. In the sultry hours of summer they are frequently to be seen dormant near the surface; in which situation they are sometimes taken by means of a noose of wire fastened to a pole, ten or twelve feet long; the wire is slowly passed over the head and branchial fins, when the fish is landed by a sudden, strong jerk.

The pike is partial to still, shaded water, where it is not liable to be disturbed, and thrives better in still water than running streams. Towards winter it retires under banks which are overshadowed by bushes, stumps of trees, old roots, and other objects which afford shelter and a basking place.

Its appearance in ponds where none were ever placed, has been thought by some extraordinary; but we may easily account for this, by well known data respecting the generation of fishes. In these cases it is probable the ova were swallowed by some aquatic fowl, and subsequently ejected into those ponds, as plants are known to have been produced, from a similar dissemination.

A gentleman in the north of England, who was as enthusiastic in regard to the " gentle craft," as old Izaak Walton himself; on reading an account of some species of sea-birds being trained to bring home to their masters the fish caught during the day, was struck with the idea of trying a similar plan with the domestic water-fowl.

Having a considerable sheet of water near his residence, he procured a large goose, and having attached a line about three fathoms in length, with a hook suitably baited, to one of its legs; he placed it in the water, to swim round at its pleasure, while he remained on the bank anxiously watching the success of his experiment.

After half an hour or more of expectation, he was gratified by hearing a loud cry from his feathered assistant, which in great alarm at the part it was so suddenly made to perform, was wheeling, diving, and screaming at a ludicrous rate; now making an involuntary sub-marine excursion, and anon striving in vain to abandon the regions of water for those of air.

The contest between the fish and its captor, lasted a considerable time, the latter using every exertion to gain the shore, and the former manifesting an invincible repugnance to accompany him. The issue seemed long doubtful, but finally, after a severe struggle, during which every inch of

ground, (or rather water,) was bravely lost and won, victory declared in favor of the goose, who triumphantly landed with an uncommon large pike in his train.

After this, the gentleman was in the habit of taking his basket and book, and reclining on the bank, amused himself with reading, while he sent his novel purveyor upon the lake to catch, or be caught, as might happen.

The goose, after a capture, apprised him by its cries, and made straight for the bank, where he stood ready to assist in securing it. In this curious manner, he seldom failed of replenishing his basket and enjoying additional sport, with far less trouble than required by the usual method.

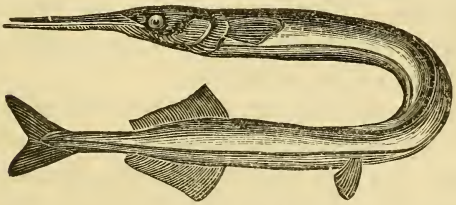
GEN. BELONE.

Sea-Pike, — *Esox Belone.* This is known by the name of spit-fish, and gar-fish, but in New England, particularly, as the bill-fish, in allusion to its long snout.

Occasionally, sea-pike have been found on the beaches two feet and a half in length. The under jaw is the longest by about half an inch, and both are bordered by a single row of sharp, needle-like teeth. On the back are two dorsal fins, with a furcated tail ; the genera color is a bright green, except the fins, which are tinged with a faint

red. Specimens are frequently brought from the West Indies, called the *Barracauda pike*, having all the external appearances of the one living on this coast, with this difference, — that it varies

THE SEA PIKE.



from five to eight feet in length — and the bones, in preparing it for a natural skeleton, become green. There is another, spoken of by Basc, *esox viridis*, but it is not the Barracauda, nor the bill-fish of Massachusetts, — though the bones of the latter become greenish on exposure to the sun.

The head of a young sea-pike from Trinidad, presented the writer by a seaman, the jaws of which are seven inches from the tip to the articulation, had a body six feet long. Though voracious and active, it is much esteemed by some for food. The sea-pike, however, may be considered scarce in these waters.

We are assured by foreign writers, many of

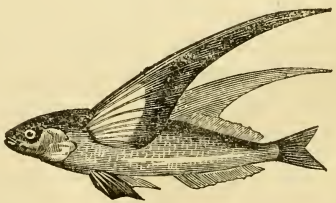
whom have figured them, that the *becuna*, and *aureo-viridis*, are natives of this country.

GEN. MESOGASTER.

Flying-Fish, — *Exocetus Mesogaster.* The body has a bright, silvery, metallic lustre; the pectoral fins, or wings, are narrower and larger than those of the Mediterranean. In the middle of the abdomen are the ventral fins.

In length, they vary from three to eight inches, but are rarely seen, except in the heat of summer. We have various specimens, which flew on board a vessel about six hours sail from land, on the coast of Massachusetts.

THE FLYING FISH.



Such is the length and fan-like breadth of the pectoral fins, that the fishes of this genus have the power of rising out of the water, and flying several hundred feet in a right line. This, however, it is supposed, they seldom attempt, unless to es-

cape from a pursuing enemy. Within the tropics they are numerous ; on this coast inward-bound vessels frequently find them on deck in the night. Sea-birds prey upon the flying fish, and the dolphin, it is reported, when it rises from its natural element, to escape the jaws of the pursuing adversary, keeps onward, well knowing that it will soon strike the water again. This is the *hirando* of the ancients.

FAMILY IV. — CYPRINIDÆ.

The family of carps, is distinguished by not possessing an adipose fin ; by a small mouth and weak jaws, — destitute of teeth. The pharyngeal bones perform the office of teeth. The branchial rays are few ; the body scaly ; the intestines short, and without cæcums. They have a swimming bladder divided into two sacks, somewhat like an hour-glass, and live in fresh water, being harmless, inoffensive, and quiet inhabitants.

In the United States we have not yet discovered the true carp of Europe, which is so extensively bred in pleasure grounds. Usually it grows to twelve and eighteen inches, but in the stagnant waters of Persia still larger. It is generally supposed to have been carried to England about 1514. The quantity of roes extruded by the fe-

male, far exceeds the weight of her body. It is also believed that they may live to more than two hundred years.

Though denominated the *wise*, on account of its sagacity, yet in the spawning season it will allow the angler to tickle its sides, and is thus easily captured by hand. The sale of carp has constituted a part of the revenues of the nobility and gentry in Prussia, Pomerania, Brandenburg, Saxony, Bohemia, Mechlenburg and Holstein, — in all of which places, the rearing of this fish is regarded with peculiar interest. We do not know why carp may not be introduced and naturalized here, and become as great a source of profit.

There are basins of water in every direction, in the immediate vicinity of Boston, of no kind of use whatever, at present, that might become most valuable appendages to an estate, by stocking them with pickerel or carp.

GEN. CYPRINUS.

Golden Carp, — *Cyprinus Auratus*. The gold fish was introduced into this country, many years since, from England, especially for ornament. It is a native of China, in the province of Chekyang; and persons of distinction, all over the Celestial Empire, rear them in vases, some of which are very costly.

The gold-fish has become climated in the northern states, and may be found in various places in Massachusetts.* There is a pond in Brookline, in which beautiful specimens may be seen, coursing along the margin.

As it is customary in towns to keep gold-fish in glass vessels, as parlor ornaments, it may be useful to remark, that the water should be changed daily, without failure. If tar, or the staves of tar-barrels are burned in the room, it is very dangerous to the fish; the lighting of a brimstone match is also very liable to kill them.

The best kind of food, extensively prepared in Canton, and sold in the shops, is a mixture of flour paste, mixed with the yolks of hard boiled eggs.

* In Venezuela, there is a curiously formed little fish, called *carribi*, extremely annoying to bathers. These are never more than three or four inches in length, and are shaped like a gold-fish, which they also resemble in the brilliant orange hue of their scales. Although they are so small, their exceeding voracity, and the incalculable numbers in which they swarm, render them very dangerous. They are, indeed, to the full as much dreaded, if not more so, by a Bañero, than the cayman. Their mouth is very large in proportion to their size, and opens much in the same manner as a bullet-mould. It is furnished with broad sharp teeth, like those of a shark in miniature; so that wherever they bite, they take away a piece of flesh. When once either man or beast is attacked by them, they will strip the limb of flesh in a surprisingly short time; for the taste of the blood spreading in the water collects them in myriads.—*Campaigns and Cruises in Venezuela.*

The Chinese Jugglers teach them to rise and fall in the water, at their bidding.

The silver-fish, or *silver-carp*, is found in the same waters with the red; indeed, in stocking the pond with the true gold-fish, in the course of a few generations silver-colored individuals make their appearance. To what circumstance this is owing we are not able to explain.

SHINER, — *Cyprinus Crysolencas.* Among the fresh water fishes, this is one of the smallest. Though we have seen individuals two inches in length, they are oftener less than one. They are a beautifully proportioned, shining little fish — the prey of their larger neighbors, and the sport of school-boys, who angle for them with a crooked pin.

MINOW, — *Cyprinus Atronasus.* This is another of the lilliputian fishes, scarcely exceeding an inch in length. It may be seen in shoals in all the little brooks over New England.

CHUB, — *Cyprinus Oblongus* — [Philadelphica, of Belknap.] In the clear rivers and rivulets in the western sections of Massachusetts, this beautiful fish is quite common. It is taken with a hook baited with the *angle-worm*. In winter, it may be

caught through the ice, by baiting with cheese and Venice turpentine.

The head is large, the back of a dusky green, the sides silvery, the abdomen white, the pectoral fins yellowish, and the ventrals and anals tinged with red. This fish seems to be very timid, and the angler therefore, in fixing himself in a good position, over some deep hole, where the chub conceals itself under the projecting long roots of trees, is obliged to move very cautiously, or he will frighten it away. For the table, the chub would be considered very excellent, were it not for the millions of little bones. They are frequently eight and ten inches long.

GEN. COBITIS.

Sucker,—*Cyprinus Teres.* [*Catastomus*]. From the earliest period of boyhood, we have been familiar with the fresh water sucker, a lazy, still fish of a dingy color, with mouth very like that of the lamprey eel, being constituted of a semi-cartilaginous ring, at the extremity of a short elastic sack, as it were, under the jaws; it appears, on close examination, as though the skin from the tip of the snout, was drawn down under the tip of the under jaw, and a hoop set in the thus elongated tube.

It basks in the hot sun, fastened by the mouth

to a stone or root, along a muddy bottom, heading towards the stream. Is this not similar to the loche of Europe? Where it is not often disturbed it attains the length of a foot and a half, weighing one or two pounds. It is a favorite sport of country lads to follow a rivulet and spear them by torch-light. As food, they are not very much prized.

Mr Bruce, the keeper of the Boston light-house, has politely forwarded a strange fish which he found in a lobster pot, that was unknown to him or any of the fishermen in his service, which has a mouth precisely like the fish above described; but the body, instead of being round, is quite thin and wide, back of the gills. The color is silvery, mottled with dark waving lines. It is in length about ten inches, and appropriately denominated the *sea-sucker*.

GEN. ABRAMIS.

Bream, — *Abramis Chrysoptera.* Commonly the bream in this part of the country is small, not exceeding seven or eight inches. The body is slender, sides silvery, the abdomen tinged with red; and the anal fin has fortyone rays.

GEN. LEUCISCUS.

ROACH, — *Leuciscus Rutilus.* This fish inhabits the larger class of rivers, and is very excellent for the table. The body seems to be compressed; — the scales are of considerable size, — the fins tinged with red; the dorsal opposite the ventrals, and the tail slightly forked. Occasionally they weigh a pound.

DACE, or DARE, — *Leuciscus Vulgaris.* This little fish is known wherever the others are. Eleven rays are found in the anal fin, and ten in the dorsal; — the length is from six to eight inches.

These are the usual kinds of fish taken in the rivers in the interior of New Hampshire, Vermont, and Massachusetts, this side of Connecticut river. Prof. Hitchcock, of Amherst College, has politely forwarded to us, specimens of the *white* and *red* dace, which appear to be very common in that vicinity.

We have not been able to procure any that exceed eight inches. Small as they are, they are exceedingly delicate and well tasted. We entertain the hope of having an opportunity of investigating the fresh water fishes of the interior, in a more particular essay, hereafter.

BLEAK, — *Leuciscus Alburnus.* This, too, is

a small fish, rarely exceeding six inches. The eyes are large with a blood-red spot on the lower side; the body is broad and flat; the color of the back is an olive green; fins pale; the lower jaw a little longer than the upper. In the anal fin are twentyone rays.

SHORT-CHUB, — *Leuciscus Cephalus.* In the western and northwestern part of the state the chub is quite common. The body is plump and silvery with a tinge of blue; the head is *chubby*, and the snout rounded; the scales pretty large and angular; fins a kind of iron rust color, the tail slightly blue; the anal fin has fourteen rays.

FAMILY V. — SILURIDÆ.

In this family there is a want of scales, the body being covered with a leathery skin which secretes an unctuous slime. The swimming bladder is attached to a particular bony contrivance, quite curious in its functions. There are cirri, or long *feelers* as they are termed by anglers, on the margin of the lips; — and there is one ray like a thorn on the anterior edge of the pectoral fins.

This family is widely spread in the rivers of America. *Pout*, *horn-pout*, *bull-head*, *silurus felio*, &c., are the vulgar names by whic

the individuals of the genus silurus are known in New England. In the great western rivers the *cat-fish*, often eight feet in length, is nothing more nor less than a mammoth *horn-pout*. Writers speak of them as the largest fresh water fishes of Europe. They are slow, sluggish, and seem to have a predilection for dark, muddy waters, in which vermin abound.

Few exceed a foot in length, in the northern states; oftener they are much short of that. In bays where, by the rise of rivers, they get introduced, they breed very fast, and bushels of them are sometimes raked out of very small pools.

They are exceedingly tenacious of life; — their vitality is so low, and their constitution so peculiar, that they may be partially frozen without destruction. The past winter the writer, by accident, left two pouts in a small tin pail, in an upper apartment of the City Hall, in the month of December, during a severely cold night; and in the morning they were found frozen closely in the ice.

After being exposed to the warmth of a stove with reference to emptying the vessel, to our utter amazement the fishes revived, and are now the tenants of a cistern in Battery March Street.

It was suggested by Bloch that the loche, placed in a vessel of water, would be a very good

barometer, as it becomes uneasy when stormy weather approaches, —putting its lips above the surface, as though gasping for air. We are in doubt, whether the pout should be placed in the genus *cobitis*, or in the place now assigned. At all events, the same uneasiness may be observed in the pout, on the approach of a change of weather.

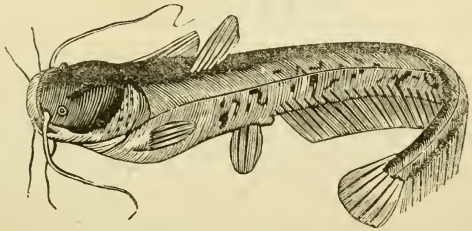
GEN. SILURUS.

At the moment of writing this article, Saturday evening, February 22d, we have before us, in a tumbler of water, a little fish of the genus *silurus*, only an inch and a half in length, taken this morning from the nose of an aqueduct pump, in Blossom Street; it must, therefore, have come from Jamaica Pond, in Roxbury, about six miles through the logs.

The mouth is somewhat like the broad jaws of the frog; the eye is large and bright, the body thick, through the pectoral fins; the abdomen whitish; the back and sides a dark olive, and from the lips eight cirri, or feelers shoot out; four under the mouth, two over the rim of the upper lip, and one at each angle of the mouth, larger and longer than the others. With these it is enabled to catch small fishes that dart towards them, mistaking them for worms, as the pout lies quietly eyeing its game.

In this respect its habits bear a striking resemblance to the sturgeon. There are two species in this vicinity; the one having but one dorsal fin and the other an adipose, or second high feathery dorsal, quite near the tail. The one before us has this second soft fin and two more cirri; the other has but six of those appendages.

THE HORN POUT.



These fishes are not much admired for the table; still they are very tolerable food. Sometimes they are sought particularly for the sick, it being supposed the flesh is remarkably easy of digestion. In taking them from the hook, which they very readily seize with almost any kind of bait, there is danger of being wounded by the pectoral thorn, which is kept at a right angle with the body, as a weapon of defence.

The truly enormous size to which they attain in the Ohio and Mississippi rivers, may well excite the astonishment of travellers. Dr Joshua B. Flint, of Boston, an accurate naturalist, remarked

to us, that during his passage up the Mississippi he had seen them six, seven and eight feet in length. The farther south we examine the rivers, the larger they appear to grow.

ORDER VII.—MALACOPTERYGII SUBRACHIATI.

FAMILY I. — GADITES.

In this family, the ventral fins are fixed under the throat, and considerably pointed; the body is covered with soft scales, the head, however, being without them; all the fins are soft; teeth in many unequal rows, like a rasp, — and the branchial openings have seven rays. Usually, all the family have two, and sometimes three dorsal fins, and a distinct caudal. The air-bladder is large.

GEN. MORRHUA.

Common Cod, — *Gadus Morrhua.* In the gill membrane are seven flexible rays; the head tolerably smooth; body covered with loose scales; generally, in all the species found at the north; ventral fins very soft and slender.

We consider it unnecessary to enter into a mi-

nute description of a fish so universally known as the most valuable production of the sea to man. The cod abounds on the whole coast of Massachusetts, but flourishes in the greatest vigor and abundance still further north.

Indeed, the cod-fishery, as adverted to in the preliminary essay on the importance of the fisheries, in the commencement of this volume, has become a business of national importance not only to this, but in fact to many other countries, contributing alike to the support and prosperity of millions of people. Several towns in Massachusetts are wholly indebted to this interesting branch of industry for their wealth and increasing commercial importance.

The cod is gregarious, going in immense armies from place to place, but remaining certain parts of the season at particular localities, which afford its appropriate food in greatest abundance; sea worms, small muscles and marine plants, are common on clear, sandy or rocky bottoms, and there the cod is caught.

It is wonderfully prolific; Leuwenhoek announced the discovery of nine millions of eggs in a single cod! thirtysix thousand have been counted in modern times. A French writer, in commenting on this curious provision for maintaining the existence of the species, says that we have the assur-

ance of an inexhaustible supply of wholesome food, secured to all succeeding generations.

The inshore cod, as on the great banks, are caught with a line, in two, six and eight fathoms of water, where the tide ebbs and flows with considerable force, over rocky soundings. Pleasure boats are often successful in hauling one or two hundred in a day, weighing from one to fifteen pounds. Those huge specimens seen occasionally in the stalls, are procured farther out at sea.

Those boats which supply the market, summer and winter, go about six miles, where, after having procured a quantity, they run up in the night to deliver them fresh the next morning to their regular customers. Many have their smacks so constructed that the fish are kept alive in the hold till the hour of sale. This is certainly much better than the old mode of keeping them till the next day, as they have a tendency to become putrid much sooner than the flesh of land animals.

The New York market is decidedly superior to Boston in this respect, viz : — the fish are actually swimming in the car when sold.

In the spring the cod seems uncommonly voracious ; for however unsuccessful it may have been in snatching the bait from the hook, and notwithstanding the mouth may have been severely lacerated, it seizes with avidity the very next it dis-

covers. Wounds heal in a few days, so that however badly the skin is torn, the gelatine of the blood is poured in so copiously as to close the breach much sooner than the healing process is completed in warm-blooded animals.

Two or three years since the keeper of Rainsford island caught a cod which had suspended to about a yard of line, a lead weight of several pounds, the other end being secured to a hook which was deeply imbedded in the bones and integuments of the upper jaw. How long the poor fish had been dragging about the inconvenient burden, it was difficult to decide.

The best bait for pleasure-party cod-fishing, is the common mud clam; by some, however, the *menhaden* is thought preferable. Many kinds of fish may be successfully caught by the flesh of their own species, but this is not the case with the cod. That the odor of some kinds of bait is particularly agreeable is well established, but the smell of putrid matter, to this fish is so offensive, that instead of playing about the hook they generally at once go beyond its influence. We extract the following remarks upon this species of fish from the Conversations Lexicon.

"Cod (*gadus*, L., Bloch.); a genus of fishes belonging to the order *jugulares* (soft-finned, subbrachial, of Cuvier), distinguished by the following

characters: — a smooth, oblong or fusiform body, covered with small, soft, duciduous scales; ventrals attached beneath the throat, covered by thick skin, and drawn out to a point; head scaleless; eyes lateral; opercle not dentated; jaws and anterior part of the vomer furnished with several ranges of moderate-sized, unequal, pointed teeth, forming a card or rasp-like surface; the gills are large, seven-rayed, and opening laterally; a small beard at the tip of the lower jaw; almost all the species have two or three dorsal fins, one or two anal, and one distinct caudal fin; the stomach is sacciform and powerful, the cœca very numerous, and the intestines of considerable length; they have a large, strong swimming-bladder, frequently dentated or lobed at its borders.

"The most interesting of all the species is the *common* or *bank cod* (*G. morrhua*, L.). Regarded as a supply of food, a source of national industry and commercial wealth, or as a wonder of nature in its continuance and multiplication, this fish may justly challenge the admiration of every intelligent observer. Though found in considerable numbers on the coasts of other northern regions, an extent of about four hundred and fifty miles of ocean, laving the chill and rugged shores of Newfoundland, is the favorite annual resort of countless multitudes of cod, which visit the submarine

mountain known as the *Grand Banks*, to feed upon the crustaceous and molluscous animals abundant in such situations. Hither, also, fleets of fishermen regularly adventure, sure of winning a rich freight in return for their toils and exposure, and of conveying plenty and profit to their homes and employers.

"Myriads of cod are thus yearly destroyed by human diligence; myriads of millions, in the egg state, are prevented from coming into existence, not only by the fishermen, who take the parents before they have spawned, but by hosts of ravenous fishes, and an immense concourse of other animals, which attend upon their migrations to feed upon their spawn: yet, in despite of the unceasing activity of all these destructive causes, year after year finds the abundance still undiminished, inexhaustible by human skill and avidity, irrepressible by the combined voracity of all the tribes of ocean. This, however, is by no means the sum of destruction to which the species is liable. After the spawn is hatched, while the fry are too young and feeble to save themselves by flight or resistance, they are pursued and devoured in shoals by numerous greedy tyrants of the deep, and, still worse, by their own gluttonous progenitors, clearly showing that without some extraordinary exertion of creative energy, the existence of the species could not have been protracted beyond a few years.

" Such, however, is the fecundity with which the All-wise has endowed this race, that if but one female annually escaped, and her eggs were safely hatched, the species would be effectually preserved. This is not so surprising when we recollect that the ovaries of each female contain not fewer than 9,344,000 eggs, as has been ascertained by careful and repeated observation. Few members of the animal creation contribute a greater mass of subsistence to the human race; still fewer are more universally serviceable than the cod-fish, of which every part is applied to some useful purpose.

" When fresh, its beautifully white, firm and flaky muscles furnish our tables with one of the most delicious dainties; salted, dried, or otherwise conserved for future use, it affords a substantial and wholesome article of diet, for which a substitute could not readily be found. The tongue, which is always separated from the head when the fish is first caught, even epicures consider a delicacy; and tongues, salted or pickled along with the swimming-bladders, which are highly nutritious, being almost entirely pure gelatine, are held in much estimation by house-keepers, under the title of *tongues and sounds*.

" The sound or swimming bladder of codfish, if rightly prepared, supplies an isinglass equal to the

best Russian, and applicable to all the uses for which the imported is employed. The liver of the cod, when fresh, is eaten by many with satisfaction, but it is more generally reserved by fishermen, for the sake of the large quantity of fine limpid oil which it contains. This is extracted by heat and pressure, and forms the well known *cod-liver oil* of commerce, which, in many respects, and for most uses, is superior to the commonly-used fish-oil. The heads of cod-fish, after the tongues are cut out, and the gills are saved for bait, are thrown overboard, on account of want of room, and because salting would not preserve them to any advantage. Yet the head, being almost entirely composed of gelatine, is, when fresh, the richest, and perhaps the most nutritive part of the fish. The fishermen, it is true, make use of it for their own nourishment, but the great mass is thrown into the sea — a circumstance we can scarce reflect upon without regret, when we remember how many poor, in various charitable institutions, and through the country generally, might be luxuriously fed with this waste. If vessels were provided with the requisite implements and fuel, these heads would furnish a large amount of strong and valuable fish-glue or isinglass, that would well repay the trouble and expense of its preparation.

"The intestines of the cod-fish also yield a tribute to the table; the French fishermen, especially, prepare from them a dish somewhat similar, and not far inferior to the sounds. Finally, the ovaries or *roes* of the females are separated from their membranes, and the eggs, nicely pickled, afford an agreeable and gustful relish, far more delicate and inviting to the palate than the celebrated Russian caviare."

The Barnstable Journal gives a statement of the cod-fishery in that district in the year 1831, from which it appears that licenses were granted to one hundred and eightyeight vessels, averaging 58 to 100 tons each. These vessels were manned by about fifteen hundred men and boys, averaging eight persons to each. The gross proceeds from the fishery is estimated at $319,060; averaging about $12,000 a share to those employed, after deducting the proportion to the owners of the vessels and incidental expenses.

Rock-Cod, — *Gadus Rupestris*, is a beautiful hard fish, taken near projecting rocks and hard bottoms, but differs in no respect, whatever from the common cod, except in color, and that is probably purely accidental, varying according to its food or locality. When the rock-cod is first drawn from the water, it has a bronze hue, but assumes

the color of tarnished brass, after having been in the air a little time; finally, when fairly dead, the skin has an iron rust complexion. The fins, too, when first drawn up, are tinged with a lively red, as though injected with arterial blood.

As it respects its quality, as an article of food, it is in high estimation, but after all, the superiority over the grey cod, is merely imaginary. We consider it the same fish.

Shoal-Cod, — *Gadus Arenosus.* This is nothing more than the common cod, notwithstanding it is thought to have a browner color and less distinct spots.

GEN. BROSMUS.

Cusk, Torsk, — *Brosmus Vulgaris.* After much trouble in procuring proper representatives of this genus, we have come to the conclusion that it is not well enough known in this section of the country, to be sufficiently prized. It is the fish occasionally seen suspended in the stalls of the Quincy market, under the name of *Cusk.*

The essential external characteristics are a grayish color, mottled with brown spots, in warm seasons, but nearly black in winter; a lateral line, both broad and spotted, a cirrus on the chin, — and upper jaw longer than the under, with thick

gelatinous lips; the dorsal and anal fins extending almost to the tail, which terminates in a rounded form. In fact, it resembles the common cod, with its caudal extremity sharpened into the form of a lancet.

Some are exhibited three feet long, weighing from eight to ten pounds, but they are not purchased eagerly, — and the reason is, no one seems to know their real value. This is the *dorsch* of Germany; the torsk of Sweden; the sma-torst of Denmark, and the tare-tosk of Lapland, — in each country, taking the first place among dishes at all fashionable tables.

It is the richest fish ever brought into the Boston market, and yet they lie on the dealer's hands till almost spoiled, before they are sold. For boiling it has not its equal; the head, particularly, is so purely a tremulous jelly, that for the debilitated stomach, no food can be more grateful or more appropriate.

We indulge the hope that gentlemen who take an interest in encouraging the best market in New England, will no longer neglect fostering the cusk fishery.

GEN. MERLUCCIUS.

Hake, — *Gadus Merluccius.* The first dorsal fin has nine rays; the second thirtyeight; the pec

toral fifteen, ventral eight; anal thirtysix, and caudal eighteen. On the whole, the hake is a well-proportioned and handsome fish, from one to two feet long, though as an article of food, undervalued in this country, notwithstanding the encomiums bestowed upon it in Europe.

It is taken in baiting other fish, particularly the mackerel, which the hake pursues from one point of compass to another, followed by a variety of smaller fry in its track, that feed on the mangled remains of the mackerel, which are floating in the train.

Hake are not taken in any quantity in Massachusetts, though exceedingly common. The coast of France is the most distinguished hake fishery in the known world. A writer of that country remarks, that since the great naval engagements between the English and French fleets, in 1759, the hake, which before visited the sea, on the shores of Bellisle, now remain through the whole year; and he supposes they were first attracted to the present haking-ground, by the multitude of dead bodies which were sunk there after that awfully bloody action.

When very hungry, the hake exhibits considerable voracity, and does not hesitate to seize a crab, which, in self-defence, sometimes fixes its shears in the retractile lips of the enemy, who

whirls it through the water with surprising velocity, till it is finally obliged to let go its hold.

Its teeth are small, sharp, and curved inwardly, giving it a decidedly mechanical advantage over many osseous fishes of its own size. Specimens of the hake have been exhibited abroad, measuring several feet. The largest caught here seldom exceed two feet. They are denominated, when prepared for market, *poor-Johns*. The best hake are taken off Cape Cod, and sold under the name of *stock-fish*.*

Haddock, — *Morrhua Æglefinus*. In Catholic countries, there is a strange notion entertained that this is the fish, out of whose mouth St Peter took the tribute money. Two dark spots behind the gills, continued to the countless generations of haddock, indicate the impression of the Apostle's thumb and finger.

Its upper jaw is the longest; the tail is forked, and the mouth small, compared with the magnitude of the fish; the eyes are large, with a black pupil; — general color of the body a pale gray,

* Though the Church of England, gives no particular directions concerning fasts, — Parliament has pursued a very strange course, by prohibiting meat on fast days, — which is for the purpose of encouraging the fisheries and navigation.

tinged with brown towards the back; there is a silvery hue on the abdomen; the medial or lateral line, in this case, quite near the back, and very dark; three fins on the back; — the first having fourteen, the second twentysix, and third eighteen rays. The first two anal fins have twentytwo, the second twenty, and the tail about forty rays.

The haddock is an every-day fish of the market, easily taken, with the line, almost any time of year, but in the winter season bears the best price, being considered superior for boiling; the flesh is compact, and of excellent flavor.

GEN. MERLANGUS.

Whiting, — *Merlangus Vulgaris.* After considerable inquiry, we are fully satisfied that the true whiting of the books, as described in Donovan, exists on our shores, but is rather smaller than the English whiting, which is greatly esteemed in England. This circumstance may be explained by recollecting that the temperature of the water is probably colder here, than in the latitudes in which they are more numerous, and more perfectly developed.

There are three dorsal fins, — the first having fifteen rays, the second twenty, and the third

twentyone ; the pectoral fins have seventeen, but the ventral only six.

The whiting is a small neat fish, only measuring from six to twelve inches, depending, in this particular, on its age ; of a whitish dun color, somewhat approaching the complexion of the pollock. They are taken sparingly in the autumn, in most of the bays at the north of Cape Cod. At the Cape, particularly, we are informed, the whiting is caught in considerable plenty. In England, the whiting fishery is one of manifest importance, protected by special acts of parliament.

When dried, they are called, in the shops, *spauldings*. One before us, taken near Scituate, measures eighteen inches in length.

Pollock, — *Merlangus Pollachius* — This is an elegant little fish, when in good condition and well grown. Good specimens sometimes measure from ten to fourteen inches. The head is narrow; the eyes are large and full ; the color approaching an olive on the back, but silvery white on the sides and abdomen ; the fins are smoky ; the tail slightly forked ; the under jaw somewhat the longest. As an article of food, they do not rank remarkably high.

Tom-Cod, — *Gadus Taucaud.* We are fully

aware of the objections that will probably be made against the following remarks on this perplexing variety of the cod, — so far as it respects the place assigned it in the classification.

Very erroneously, the tom-cod has been supposed to be peculiar to this section of the United States, and a stranger, therefore, to other seas. After a careful examination of the plates and descriptions of foreign writers, together with the live fish before us at the moment of making these observations, it is apparent that the tom-cod is well known in some parts of Europe.

From a note in a French work on icthyology, it is pretty evident that by *tācaud*, is indicated the fish known to us by the appellation of tom-cod, — though the writer was probably wholly indebted to some American for the description of it.

The Hon. John Davis, a gentleman ably qualified to examine and determine correctly, informs us that *tom-cod* is probably a corruption of *taucaud*, and if this is the fish indicated by Cuvier, then "*Gadus Taucaud*," would seem preferable to the name which has been given it by Dr Mitchell, of New York, *gadus tomcodus!* Judge Davis says the doctor's scientific name generally excites a smile, when pronounced, but in defence, he can plead, if necessary, the *Felis catus*, and *mus rattus* of Linnæus!

Judging, however, from analogy, we are decidedly of the opinion that *tom-cod* is a corruption of an Indian name, *tacaud, plenty fish*, and we are confirmed in this theory, from a belief that this fish was undoubtedly very familiar to the aborigines of this section of the country, and therefore known to our ancestors only by its Indian name, which in process of time degenerated from *tacaud* into *tom-cod;* or in other words underwent a corruption, which finally settled into *tom-cod*, — a very natural sort of vulgarism with men who were never ambitious to be particularly exact in the pronunciation of Indian terms.

In support of this view of the subject, respecting the origin of the present appellation, there are several edible fishes which still retain their Indian names, and which bear a striking relation to tacaud, viz: — *sca-paug*, shortened by the fishermen into scup; *tataug*, — the *tautog;* and lastly, *pau-haug*, also murdered by piscatory vandals, till in these times, the fish assumes the formidable cognomen of *pau-ha-gen*, and finally, becoming still more improved, it turns out to be the *menhaden*, the latest coined word of their vocabulary.

The tom-cod may be recognised by three dorsal fins, two anal, three abdominal, and two pectoral. The abdominal are small and slender, being before the pectoral, as it respects the head; un-

der the tip of the underlip is one short stump-like cirrus. The caudal fin is broad and rounded at the extremity. Teeth fine, both in the throat and jaws; white, small and plump tongue; the lateral line waving upward. Its color varies at different seasons of the year, from a rich orange to a light greenish yellow, shaded by a dark brown on the back, and gradually becoming a light yellow between the vent and gills. It varies in length, from six inches to fifteen, and weighs from a quarter to nearly two pounds, depending, of course, on the age, sex and season. In the north of Europe, admitting this to be the fish, which cannot at present be doubted, they have been occasionally known to exceed eight pounds. The spawning season appears to be in February, in this climate; about the last of May they begin to take the hook. From that period till the last of October, they are in the greatest perfection, and in the greatest abundance also.

Although Dr Mitchell furnishes a catalogue of six varieties of the tom-cod, ("*gadus tomcodus; G. tomcodus fuscus; G. tomcodus luteus; G. tomcodus luteo-pallidus; G. tomcodus pluinosus;* and *G. tomcodus mixtus*,) we are fully convinced, after a series of critical observations, that these are all imaginary distinctions.

In Massachusetts, the first species is only famil-

iarly known. The variations of color and size depends on the age of the individual, and the quality imparted to the water by the character of the bottom on which they feed.

Frost fish, *Gadus Luscus*, of New Hampshire, and the *G. tomcodus pluinosus* of New York, present no external characteristic differences. In fact, these too, we conceive are imaginary varieties, assuming perhaps, a more chubby appearance, and a darker skin in the winter than in the summer. They are denominated frost-fish, simply because they are taken in scoop-nets through the ice, in places only where the tide rises very high; hence, the farther we go to the northeast, the more common the fish. At Eastport they are very plenty in the heart of winter, the very time when few or none are seen in our harbors in this region.*

The following are the characteristic differences of the supposed varieties.

Brown Tom-Cod, — *Tomcodus Fuscus*, — mottled with brown olive on the back and sides.

* A gentleman of observation remarks, that although the tom-cod is scarce in the harbors in the winter, they may be taken plentifully in the ponds and basins of streams, in Medford and other neighboring towns, which have a communication with the tide water. He further observes, that in the winter it is a charming exercise to search for them through the transparent ice. When the fish is at rest, the ice directly over it is struck with an axe, which brings it up instanter. A hole is then made and the fish collected in baskets.

Yellow Tom-Cod, — *Tomcodus Luteus* — having the sides yellowish, as well as the margin of the abdomen.

Yellow-white Tom-Cod, — *Tomcodus Luteo-Pallidus* — a mixture of white and yellow, with shades also of brown and olive.

Frost-Fish, — *Tomcodus, Pruinosus* — so called because more abundant inshore at the setting in of frosts in November, but it is only then seeking a retreat in bays, &c., for the coming winter.

Mixed Tom-Cod, — *Tomcodus Mixtus.* This too is altogether an imaginary variety — age, sex, and the season, are constantly modifying the appearance.

GEN. RANICEPS.

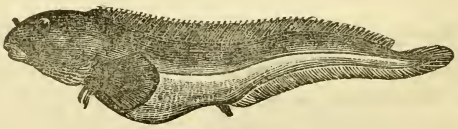
Blenny, — *Blennius Viviparus*, — [*Raniceps Trifurcatus, Cuv.*] If the specimen before us, the true viviparous blenny, is not an eel, it is very certain that it does not belong to the gadus family, where, in this dilemma, we have unluckily placed it. Linnæus has a distinct genus, *blennius*, but the individual now being described, a well marked representative of the family, as they are found in this state, does not precisely accord with the descriptions of the blenny by English writers.

On looking over that splendid series of German lithographic plates of fishes, by Dr Strach, 1828,

an exact figure even to the coloring, was noticed, which truly exhibits the blenny of the harbors of Massachusetts, and must, therefore, we strongly suspect, have been drawn from the American blenny.

Its length is from one to two feet; the head is thick and broad, projecting teeth, white, retractile lips, and a second row of fine, sharp, small teeth or holders, on the margins of the jaws just within the first arch. The second dorsal fin reaches nearly to the tail; the ventral fins are rather slender, trifurcate, with a lateral line tuberculated above the pectoral fins.

THE BLENNY.



The shape of the blenny is lanceolate, from the pectoral fins to the tail, which ends in a point or soft brush of flexible caudal rays. The dorsal, anal and caudal fins are all united into one, excepting at one place near the tail, encircling the back and belly, with this one exception, and terminating at the vent.

The pectoral fins have seventeen rays. Its

color is smoky, spotted with faint yellow dots, beside broad cloudy spots extending from the sides quite into the dorsal fins. With the fishermen north of the Cape, this is called the *mutton-fish*. In Germany the same fish is called *mother of eels*. Though snake-like and disgusting to the eye, it is said to be excellent eating.

No doubt, varieties of the blenny may yet be found on this sea-board, of which we have at present no particular knowledge. We cannot always rely upon the descriptions of the fishermen, who in their anxiety to preserve the specimens designated on the catalogues they are furnished with by us, are too apt to imagine that they unfortunately lost the very fish that was most wanted. "*The very one, in fact, mentioned on the list.*" The bay of New York furnishes two varieties of the blenny unknown in Massachusetts, viz: — *Blennius Pholis*, and *B. Ciliatus*.

Raniceps Blennioides. We have been presented with a cream-colored fish truly disgusting in appearance, which appears, with the exception of the color, to be the blenny in miniature. To some boys who accidentally captured it in the outer basin of Boston harbor at low tide, it seemed to be known as the *garter-fish*, — rather from its

color, it is conjectured, than from its supposed resemblance to a garter. It is twelve inches long.

FAMILY II. — PLEURONECTES.

No family of aquatic beings is characterized by so many strange circumstances. The eyes are both on one side, but so arranged as to look upward at an angle of about eighty degrees. The side on which the eyes are fixed is always colored, but the opposite one is quite light or whitish. In fact, their anatomy demonstrates the greatest want of symmetry. Writers remark, among other things, that the two sides of the mouth are unequal, and it is very rare to find the pectoral fins resembling each other. In the branchial membrane are five rays; the body seems to be compressed, as though pressed between two stones; — the dorsal fin encircles the fish like a ribbon, so that the *back* is on one side! The venter, or inside cavity, is quite small, but prolonged into a canal in the side of the tail: there is no air-bladder; and the skull is the oddest of all crania, in consequence of the arrangement for accommodating both eyes on one side.

Notwithstanding the confused manner in which the skeleton is apparently put together, distorted and twisted into the queerest form, there is only

about the ordinary number of bones, entering into the composition of other fishes. Sometimes we find one with the eyes reversed.*

The flat fish of this family appear to be universally spread over the globe, in all seas and in all climates, affording an excellent, nutritious and wholesome food. Linnæus gathered the whole family into one genus, but the celebrated Cuvier subdivided it into several sub-genera.

GEN. PLATESSA.

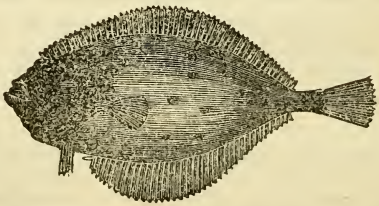
Flounder, — *Platessa Vulgaris.* Being without the swimming-bladder, they naturally keep near the bottom. Indeed, organized as they obvi-

*At St Petersburg, it was formerly customary for the bishops to bless the fishes annually, and in France it was once gravely told, that when a certain St Christopher blessed the inhabitants of the deep, the fishes came round the holy man to listen, but the flounder, in derision, made wry faces; upon which the speaker feeling highly insulted, condemned the whole race thereafter to be screwed into their present distorted condition.

In Constantinople, says Mr Goodell, a missionary, now residing in that celebrated city, is a Greek Church, or the ruins of one, called the fish-church. It is outside the Silivria gate, where the Turks entered on taking Constantinople. At that moment, some priests were frying fish for dinner, which were so frightened, when the priests were killed, that they jumped out of the pan, "not into the fire," but into a pond under the present ruins, where, if common report be true, they are still seen swimming about completely cooked on one side.

ously are, for looking upward, rather than downward, their food as well as the objects they are to avoid, are to be sought for above. They bear a strong resemblance to the flat fishes that swim on one edge, as it were, but the flounder has not the power of maintaining that position. Almost the entire circumference of the body is fringed with a stiff, prickly rayed fin, which, when expanded, gives the flounder a waving, easy movement in the water. It is quite rapid in its movements, but prefers to remain on the surface of the mud, into which it nestles for concealment, in case of fright. Under favorable circumstances, they grow to a great size. As an article of food they do not appear to be sufficiently prized.

THE FLOUNDER.



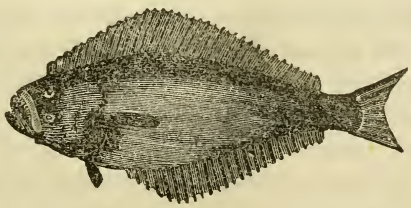
The flounder is generally known, and its character well understood. The eyes are sometimes on the left side, but not often. It is one of the most common fish in Massachusetts Bay, vary-

ing in size from the palm of the hand to fifteen inches in length by ten in breadth. The flounder delights in the soft mud about docks, the mouths of rivers, and salt marshes, where it is taken about seven months in the year. In warm weather the flesh is soft, and much less palatable than in the spring or autumn. Its food appears to be marine insects, the spawn of other fishes, and small muscles. About the Boston light-house, at low tide, flounders are taken by spears, of all sizes, for baiting lobster-pots.

GEN. HYPOGLOSSUS.

Holibut, — *Hypoglossus Vulgaris.* In this genus, the holibut is the most conspicuous. It is a voracious fish, pursuing crabs, small lobsters, &c. but feeds principally, it is supposed, on shell-fish,

THE HOLIBUT.

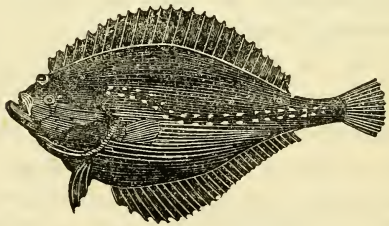


which are so common on soundings, as the coast of New England is approached. In the vicinity

of Cape Cod, the largest brought to market are successfully taken with the line. They are sometimes really enormous in size, weighing five hundred pounds.

Plaise,— *Platessa Vulgaris.* The plaise, much resembling the flounder, is not recognised, generally, as a different fish. It may be known

THE PLAISE.



by small yellowish spots dotted over the back. This fish is uncommonly thin and broad, and has small tubercles, six in number, near the left eye.

On the authority of Mr Simon E. Green, an ichthyologist, we are inclined to suppose a fish called the *pearl*, of Boston, which he assures us he has inspected, and compared with a plate, is that which is named the American turbot, or plaise. Having, however, never seen the *pearl*, we are unable to decide how much they differ from the European. A gentleman whose observations are

to be credited, assures us that he cannot perceive the least possible difference between the turbot of this country and that taken on the British shores; and the testimony of an intelligent fisherman, residing on Lovell's Island, fully corroborates the statement of the gentleman referred to.

William Ladd, Esq. of Maine, the distinguished advocate of the Peace society, informed us that when the English fleet visited Boston, and held possession of the town, in the year 1775–6, the officers were bountifully supplied with *turbot*, which were caught in the neighborhood of the outer harbor. He further remarked, that about all they did, while here, was to eat them!

Mr Parker, the conductor of the Marine Telegraph, mentioned, in the course of conversation, that many years ago, Admiral Sir Isaac Coffin brought out to this country a *traul* net, such as are used on the coast of Holland for taking *sole* for the London markets, with which he succeeded in capturing that delightful fish, in Ipswich Bay, which was not before supposed to exist here. Being a flat fish, destitute of an air-bladder, they swim close to the bottom, and rarely bite at the hook. Another gentleman, however, thinks this is a mistake — for he assures us that a traul net was dragged by the frigate Constitution, along a

considerable extent of our coast, without bringing up a single turbot or sole. Still, although there is something contradictory in these statements, we are fully inclined to believe that both of them are in our harbors.

GEN. SOLEA.

Sole, — *Solea Vulgaris*, is thought to be an inhabitant of our harbors, bordering on the deep water, nearly two feet in length. Its scales are rough and small, and are covered with spines. The habits of the sole are much like the flounder. The mouth is on the side opposite to the eyes, and the jaws are without teeth on the side on which the organs of vision are placed.

GEN. RHOMBUS.

Turbot, — *Rhombus Maximus*. Probably this is the most valuable of the flat-fish, being of a firmer texture, and growing much larger than either of the others, with the exception of the holibut. Sometimes it weighs thirty pounds, though, in this region the coldness of the water, it may be supposed, would keep it below size. It may be known from the flounder by having its eyes on the opposite side; by its brownish or dirty shade of yellow; rough, tuberculous skin, mottled with dark spots. In England the turbot sustains the

first place on the table. The turbot fishery is exceedingly profitable in that country, but attended with heavy expenses. Sometimes the line is a mile in length, from which short lines drop into the water, supported by buoys. When the fishermen perceive that a sufficient number of fish are fast, to compensate for drawing the warp, the two extremities of the rope are carried by strongly rowed boats to the shore, where, inch by inch, the multitude are brought to land. This fish is taken occasionally on the holibut fishing-ground, near the Cape.

FAMILY III. — DISCOBOLI.

GEN. CYCLOPTERUS.

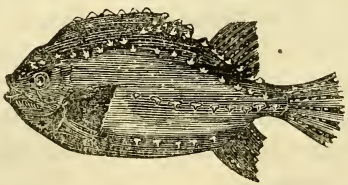
Lump-Fish, — *Cyclopterus Lumpus.* A marked character of the fishes of this genus, is the arrangement of the ventral fins, the rays of which surrounding the pelvis and connected by a curious membrane, form an oval and concave organ, by which they are able to fix themselves firmly whenever they choose.

Mr Pennant relates that, "on throwing one into a pail of water, it adhered so firmly to the bottom, that on taking the fish by the tail the whole was lifted, though it contained some gallons."

When the ocean becomes severely turbulent, it is supposed they fasten on stones, to keep from being driven suddenly on the rocky shores, which they seem fond of frequenting. We have found them on Long Island, in Boston harbor, after a long continued northeast storm, weighing about six pounds. It is barely possible that the anchor on which they fixed for security, was torn from the bottom, and both washed on the beach together.

The sucking surface acts upon the same principle of that upon the head of the remora, though differently constructed, both being air-pumps. Frogs adhere to trees by fleshy pads on their toes, which are very similar to the lump-sucker's oval cushion; and either of them will sometimes allow the body to be drawn in halves, before they let go their hold.

THE LUMP FISH.



Lump-fish and lump-sucker, are names indifferently applied to the same fish. From the middle of June till September, they are often drawn up in fishing for cod and haddock. Being short and

thick, and of a bluish purple color, together with rigid fins, they are rather uncouth in appearance. Some attain the length of a foot and a half, but we have not been fortunate in procuring a specimen of more than twelve inches long. The head is obtuse; the tongue short; teeth small and sharp; the gill membrane has four rays; the operculum is constituted of one piece only; the body thick and totally destitute of scales; the ventral fins united. On the sides are dark, prominent spots, but bordering on the abdomen they become lighter; the belly is of a bright red, in midsummer; pectoral fins orange, shaded with a redish tinge, and the eyes are sparkling red.

We are assured they are a very tolerable article of food, but of the truth of the remark, we have had no experience.

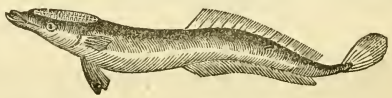
Small-Lump-Sucker, — *Cyclopterus Minutus.* In one bottle we have several specimens of this little fish, not exceeding three quarters of an inch in length. They have the same holding apparatus in a miniature form, and may be known from the young of the *lumpus*, by two white tubercles on the sides.

GEN. ECHENEIS.

Sucking-Fish, — *Echeneis Remora.* Two species of the remora are occasionally taken on

this coast, but in no other way than on the bodies of sharks or the bottoms of vessels. The one under consideration usually measures from four to twelve inches, and is of a leaden color; the body is long and slender, covered by minute scales, and on the back is one dorsal fin without spines. On the top of the head is an oval spot which looks, at first view, as though a slice of the cranium had been cut off nearly on a level with the eyes. This oval place is termed a disk, constituted of two rows of transverse plates like the bars of a gridiron. Perhaps to compare the bars with a Venetian window blind, will convey a better idea of the appearance than anything else. Each plate stands at

THE SUCKING FISH.



about the same angle as the slats of the blind, and there is a space between every two of them. If the edges were turned towards the snout, they would be thrown up, and thus retard the motion of the fish; but by being directed backward, the greater the velocity the closer do the edges of the plates fold down over the spaces.

There are eighteen in this species, nine in each

row. It is no uncommon circumstance to find them adhering to vessels, and to sharks, for which latter they seem to have a predilection. This disk is upon the principle of an air-pump, precisely in office like the adhering surface on the breast of the lump-fish.

All the fins of the remora are small, so that it cannot swim with much speed, but it makes up the defect by fastening itself to any other fish it chooses, out of the reach of its jaws, and thus, without effort, glides through the ocean with prodigious velocity, increasing or diminishing the rate, it is supposed, according to its own particular fancy, by the irritation it causes with the disk.

The ancients entertained a notion that this fish had the power of arresting the motion of a vessel at sea. The poets propagated the error, which still has believers among the vulgar.

> "The sucking-fish, beneath, with secret chains,
> Clings to the keel, — the swiftest ship detains; —
> And though the canvass bellie with the blast,
> And boisterous winds bend down the cracking mast,
> The bark stands firmly rooted in the sea."

Aristotle's admiration was excited by the organization of the remora, nearly two thousand years ago. The fate of the famous battle of Actium was imagined to have been decided in favor of Augustus, in consequence of the powerful

agency of a sucking-fish, that stopped Anthony's ship.

Wherever sharks exist, there the remora may be expected; when once fastened on, they seem unwilling to let go their hold, and like the old man of the sea, on the shoulders of Sindbad the sailor, they ride their enemies till they die.

We are inclined to the opinion that most of the specimens procured in this latitude have been voyagers from the neighborhood of the tropics.

Indian Remora, — *Echeneis Naucrates*. We have a specimen of this species over two feet long, the proportions of which are truly elegant. The color has a greenish tint, but the sucking surface in shape precisely like the last described, has twentyfour plates.

With this, the natives of Cuba formerly carried on a very singular sort of angling, which was in the following manner. A strong, small twine was made fast round the tail of the fish, which, by the way, was kept in a vat, and carried in a vessel of water, wherever its services were required, and then thrown overboard. It ran instinctively toward the first fish which the length of line would permit it to reach, and instantly made itself fast. The moment the fisherman felt that such was the case, he gently drew in the line, drawing

both near the surface. He then carefully reached his hands under the water, and thrust a finger under the edge of the disk, which at once broke the connexion. When he had secured the game he then permitted the remora to run again, and in that simple, though ingenious manner, it was the most successful mode of fishing of which there is any account, unless it be the cormorant fishing of China, alluded to in another part of this volume.*

Interesting remarks on the remora will be found in Capt. Couthuoy's letter to the author, under the article mackerel.

* Sir George Staunton, when the embassy was proceeding on the great southern branch of the canal in China, saw the Chinese fishing on a large scale, on a lake, with the cormorant. There were thousands of small boats and rafts built expressly for this species of fishing. On board of each were ten or a dozen of those birds, which, at a given signal from the owner, plunged into the water, and it much astonished Sir George to see the enormous size of the fish which they returned with in their bill. At that place, they were so well trained, that it did not appear necessary to place a ring on the neck to keep them from swallowing the prey. The master occasionally gave them a portion, by way of encouragement.

ORDER VIII.—MALACOPTERYGII APODES.

In this order, we are presented with a family distinguished by their long, serpent-like bodies; a thick, remarkably tough skin, and though it is generally conceded that they have swimming-bladders, they are either too small to be of much service, or answer some other purpose in their economy, as nearly all of them prefer concealment on a muddy bottom, rather than clear water. The spine usually contains one hundred and sixteen vertebræ, so slightly attached that they are exceedingly flexible. Lastly, most of the fishes of the auguilliform structure are viviparous. Generally the head is smooth; the eyes defended by the skin, (conjunctiva,) as in serpents; the body nearly round and slippery, in consequence of a slimy excretion; in the gill membrane are commonly ten rays; the branchial openings are near the head, and usually close to the pectoral fins; the dorsal, caudal, and anal fins are united into one like a border. The color seems to vary according to the character of the water they inhabit.

GEN. AUGUILLA.

The Common Eel, — *Auguilla Vulgaris.*

The eel is most certainly the intermediate link between serpents and fishes, possessing not only a similar form to the first, but many of their peculiar traits of character. Eels can live alternately in fresh or salt water, or abandon both, with impunity, and subsist for a short time on land. They leave their aquatic hiding-places, in warm summer evenings, having the power of closing up their gills, to crawl over marshes in search of snails, and putrid animal remains,— evidently exhibiting an exquisite sense of smell.

Oppian, who flourished many centuries ago, was familiar with the habits of the eel, which are adverted to in the Halieuticon, in the following lines.

> "Thus the mailed tortoise, and the *wandering* eel,
> Oft to the neighboring beach will silent steal."

Dr Hancock, a distinguished icthyologist, says of the *Doras Costata*, or *Hassar*, "This species is one of those fishes which possess the singular property of deserting the water and travelling over land. In those terrestrial excursions, large droves of the species are frequently met with during very dry seasons, for it is only at such periods that they are compelled to this dangerous march, which exposes them as a prey to so many and such various enemies.

When the water is leaving the pools in which they commonly reside, the yarrows, (a spe-

cies of Esox Lin.) as well as the second species of hassar, to which I shall presently refer, bury themselves in the mud, while all the other fishes perish for want of the natural element, or are picked up by rapacious birds, &c. The flat headed hassars, on the contrary, simultaneously quit the place and march over land in search of water, travelling for a whole night, as is asserted by the Indians, in search of their object. I have ascertained, by trial, that they will live many hours out of water, even when exposed to the sun's rays.

"Their motion over land is described to be somewhat like that of the two-footed lizard. They project themselves forward on their bony arm, by the elastic spring of the tail exerted sidewise. Their progress is nearly as fast as a man will leisurely walk. The strong scuta, or bands, which envelope their body, must greatly facilitate their march, in the manner of plates under the belly of serpents, which are raised and depressed by a voluntary power, in some measure performing the office of feet. It is said that the other species, the round head, has not been known to attempt such excursions, although it is capable of living a long time out of its element; but as I before observed, it buries itself in the mud in the manner of the yarrows, when the water is drying up.

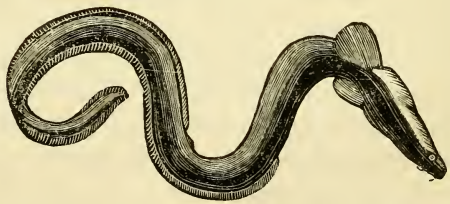
"The Indians say that these fishes carry water

with them for a supply on their journey. There appears to be some truth in this statement; for I have observed that the bodies of the hassars do not get dry like those of other fishes when taken out of the water; and if the moisture be absorbed, or they are wiped dry with a cloth, they have such a power of secretion, that they become instantly moist again. Indeed it is scarcely possible to dry the surface while the fish is living.

"On inspecting an old journal which was kept during a tour to the Parmia, in 1810, I find that another species of these mailed fish inhabit the rapids of the Essequibo (interior of Guiana) one of which was caught by the Indians while employed in hauling our canoes over the falls of that river, and attracted my attention by its curious structure and vivid coloring. It is remarked in the note alluded to, that this fish is not only furnished with the common appendages for swimming, but also with four strong bony supports, one attached to each of the pectoral and belly fins, (i. e. constituting the first ray of each) by which the animal creeps on the bottom of the river, and perhaps where there is little or no water also, being, as it seems, partly amphibious; for although it had received a severe wound on the head, it did not expire till it had been many hours out of the water. It has no proper teeth, but short, flexible,

curved spines (or *setæ*) on the lips ; one row on the upper, and two on the under lip, (the upper jaw short and moveable.) The pectoral fin has six *radii*, besides the leg, if I may so term it, or ambulatory spine. The head and the whole body, except the thorax, are guarded by a coat of mail, consisting of strong bony plates, supporting four longitudinal rows of curved spines on each side ; color of the body bright reddish yellow, elegantly variegated with black spots ; the fin red at the extremities. It grows to about a foot in length.

THE COMMON EEL.



Eels, when kept in fresh water ponds, grow very large, and are very voracious ; they are known to swallow frogs and lizards whole, which have been found in opening large ones. A gentleman at Twickenam, England, had a large pond, on which he bred a number of ducks and geese. He was much astonished by the disappearance of large

numbers of goslings and ducklings, as soon as they took to the water. Having occasion, about this time, to draw his pond, he found a number of eels, and on opening them, the undigested remains of many of the lost birds were found. Eels have been caught in fresh water ponds, weighing eighteen and twenty pounds.

They are supposed to be more universally spread over the globe than any other tribe of animals, with the exception of man. It is said that none are seen above the Falls of Niagara, or in Lake Erie. Some one supposes that all the eels in the interior visit the sea, annually, and then return from their pilgrimage to the old spot; — and it is moreover asserted, but certainly on doubtful authority, that if an eel remain habitually in fresh water, it becomes barren. We do not credit a word of this; there is some want of accuracy in the examination.

Though they have been repeatedly seen fifty and sixty feet high on the rocks of the cataract, wending their way up, they never yet succeeded in the enterprise. Mr Clinton supposes the reason why eels do not exist in Lake Erie, if any were left there on the subsiding of the waters of the flood, is because their communication was cut off from the ocean, and in illustration of his theory, relates that the Passaic river is formed by the

union of three considerable streams, Rockaway, Long-Pond, and Ramapough creeks, until a canal, some years ago, was cut around the great falls at Peterson, no eel was ever seen in the waters above. Since that work was completed, the water abounds with them, distinguished for size and quality. He further remarks, that in the spring, elvers or young eels are seen in immense numbers, ascending these streams.

Eels, in olden times, were believed to be either hermaphrodites, impregnating themselves, or else they sprung spontaneously from the mud, by solar influence. Oppian describes the generation thus:

> "Not thus conchs, eels and polypi embrace,
> Nor purple lampreys rear their embryo race, —
> In selfish coils, hermaphrodite they sit,
> And their own power, the vital spume emit, —
> Which, gradual dropp'd on sands or slimy mud,
> A silver offering renders to the flood."

Mr Jesse says that he has been informed, upon the authority of a nobleman, that if an eel is found on land, its head is invariably turned towards the *sea*, for which it is always observed to make in the most direct line possible. If this information is correct, and there seems to be no reason to doubt it, it shows that the eel, like the swallow, is possessed of a strong migratory instinct.

We can ourselves partly confirm this statement,

for we have seen an eel more than twenty yards from a river, making its way to it like a snake through the grass of a moist meadow; and what is perhaps more uncommon, we have watched an eel rising repeatedly to the surface of a stream to bite off and feed upon the duck-weed floating at the top.

An amazing number of eels are bred in the two large ponds in Richmond Park, which is sufficiently evident from the very great quantity of young ones which migrate from those ponds every year. We are assured that at nearly the same day, in the month of May, vast numbers of young eels, about two inches in length, contrived to get through the pen-stock of the upper pond, and then through the channel which led into the lower pond, from whence they got through another pen-stock into a water course, which led them eventually into the river Thames. They migrated in one connected shoal, and in such prodigious numbers, that no guess could be given as to their probable amount.

An annual migration of young eels also takes place in the river Thames in the month of May; and they have generally made their appearance at Kingston, in their way upwards, about the second week in that month, and accident has so determined it, that for several years together it was

remarked that the tenth of May was the day of what the fishermen call eel fair; but they have been more irregular in their proceedings since the interruption of the lock at Teddington. These young eels are about two inches in length, and they make their approach in one regular and undeviating column of about five inches in breadth, and as thick together as it is possible for them to be. As the procession generally lasts two or three days, and as they appear to move at the rate of nearly two miles and a half an hour, some idea may be formed of their enormous number. The line of march is almost universally confined to one bank of the river, and not on both sides at the same time; but, from some instinctive or capricious impulse, they will cross the river, and change the side without any apparent reason for doing so.

When the column arrives at the entrance of a tributary stream which empties itself into the river, a certain portion of the column will continue to progress up the tributary stream, and the main phalanx either cross the river to the opposite bank, or will, after a stiff struggle to oppose the force of the tributary branch in its emptying process, cross the mouth of this estuary, and regain its original line of march on the same side of the river. In consequence of the young eels dispersing them-

selves from time to time, as occasion offers, in the manner above described, the shoal must imperceptibly lessen until the whole have disposed of themselves in different places.

I have not yet been able to ascertain at what distance from Kingston the shoal has been seen. The locks at Hampton, Sunbury, &c., must, however, retard their progress upwards. These young eels are easily taken: and persons who want to stock their ponds with them have only to lower a bucket into the midst of the shoal, which many persons do, who reside in the neighborhood of the river, and a sufficient number is immediately taken to answer their purpose.

There is no doubt but that many of these little animals perish during their progress; but the numbers which are annually taken in our rivers show that a sufficient quantity escape to stock them abundantly. * * * The most speedy methed of killing an eel is by putting it into tepid water.

On the marshy borders of the ocean, and at the entrance of large, shallow bays, and the mouths of rivers, where there is a deep soft mud, eels abound beyond all human calculation.

Three varieties of the eel, only, are familiarly known in Massachusetts; yet it is very probable several others exist, of which we have, at present,

no knowledge. The mud-eel is exceedingly common. Perhaps there is no one fish, the generative process of which has given naturalists more vexation than this; hence the old and vulgar notion that there was no distinction of sex, and that they originated spontaneously from the mud. Let it be understood, however, that modern perseverance has settled the question, as the males can readily be distinguished from the females. They are viviparous, and are impregnated as all cartilaginous fishes are. *

That the eel is wonderfully tenacious of life, has become a proverb, — *live as long as an eel.* Hours after being deprived of the skin, as may be daily noticed in the market, they continue to exhibit violent and rapid contortions.

In the year 1803, the water from an overflown quick-silver mine, at Idua, in Austria, having been

* Male crabs may be distinguished from the females by the organization of the flap or apron, on the breast of both, and yet this has been a long disputed point, like the quarrel about the sex of eels. That on the female is large, loose, broad and easily opened when the animal is alive. On the male, it is smaller, firmer, and less easily opened; under it are two thread-like organs, but in the female there are two orifices, tipped with cartilaginous rings. *En l'union sexuelle, les fémelles couchées sur leurs dos récoivent ces excroissances filiformes dans les deux ouvertures ou 'vulvæ.* This is the only example within our knowledge, of a double procreative apparatus.

pumped out and carried into the river Idua, that river became so impregnated with vitriolic acid, mercury, and iron ochre, that all the fish were destroyed, save the eels, which were found uninjured, and seemed to bid defiance to every thing but actual roasting or boiling.

So well known is the eel, that it is unnecessary to give a more minute account of its external appearance.

A gentleman of veracity, residing on Cape Cod, informs us that in the spring an eel makes it appearance in that section of the country, which from its peculiar locality is called the *sand-eel.* This fish is found at different places in the sand, at a distance from the water. Probably, from his remarks, this fish resembles, both in conformation and habits, the *hassar.* He has not been successful in obtaining a specimen, as at the time of writing, they were not to be found. It is also very possible it may be the *ammodytes tobianus*, or sand lance, of Europe.

Aqueducts, which have their origin in still water, as ponds, for example, should be carefully guarded by metallic strainers, otherwise eels will course through the pipes to the other extremity. They seem to have a predilection for such hiding places, but as they cannot turn round in the log, nor make their exit the other way, vast ex-

pense may be incurred in searching for the ob struction, — the eel sliding along, from point to point, as the workmen proceed. Such is their tenacity of life, that they could live years together, in this way, — therefore there is no hope that death and dissolution of the body, will speedily remedy the evil. A few years since, in taking up a joint of the aqueduct in Boston, which conducts the water from Jamaica Pond, in Roxbury, an eel nearly two feet in length was taken from the log, that quite filled its calibre.

Prof. Hitchcock has furnished us with a specimen of the *silver-eel*, so called, in the vicinity of Amherst College, which, though a little smaller than the common mud-eel, precisely resembles it, and therefore we are inclined to the opinion that the shining color on the sides, which has given it the name, is an accidental circumstance.

In the salt ponds of Martha's Vineyard, where the tide water flows in, an eel is taken, called the *meshaw-eel* which has been supposed to be peculiar to that region. David Eckley, Esq. of Boston, who has a better and more practical knowledge of scientific angling, than any gentleman in the circle of our acquaintance, has given it as his opinion that this is a new species. Not having it in our power to procure a specimen, at this particular juncture, — when the compositor is constantly re-

quiring manuscript, we hope to collect the facts for a future period.

In the neighborhood of Montreal, in Canada, the eel fishery is conducted on an immense scale; thousands upon thousands may be seen in the pens on the banks of the river, writhing and twisting like so many anacondas, waiting their turn to be slaughtered. They are packed in barrels, well salted; and great quantities are also smoked, &c. not only for home consumption, but for exportation. This part of the trade is the most intolerably disgusting process a person of any sensibility can witness. The St Lawrence eel is the *conger*, some of which are several feet in length, and nearly as large as a man's arm.

The Conversations Lexicon says, that there are numerous instances on record of eels having attacked and overpowered boys in the water. In their native element, they can certainly exert prodigious strength. An oil is tried out of them, which burns as well as the best whale oil.

A vulgar notion exists in this country, very generally, that the skins, tied round the body of an individual, are powerful anti-spasmodics. Indeed, it is quite common to see persons bathing, with one of them twisted round the leg to keep off the cramp.

Eels are the boa-constrictors of the ocean,

oftentimes overpowering their prey by suddenly coiling round the bodies of fishes, whose bones and flesh are bruised instantly into jelly.

On the whole, we view the eel in the light of a water-serpent, being the connecting link between purely aquatic and amphibious reptiles. That the flesh is nutritious cannot be denied, and so is the rattle-snake, and eaten too, by the aborigines with as good a relish as the epicurian swallows his potted eels. Though we are unwilling to eat them ourselves, simply from the influence of unpleasant associations, yet, as the toper said of the flies, when he put them back into the tumbler, though we don't like to swallow them, we do not know but others may.*

After the formation of ice, in the autumn, eels bury themselves two and three feet deep in the mud, where they remain in a partially torpid state till the returning warmth of spring; they are so easily affected by cold that individuals rarely leave their quarters, unless forced to by the fishermen. At the commencement of winter, multitudes of

* "Up jumped the Bacchanalian crew, on this,
Taking it very much amiss,
Swearing, and in the attitude to smite —
'Lord,' cries the man, with gravely lifted eyes,
'Though I dont like to swallow flies,
I did not know but others might.'"

Peter Pindar.

people may be seen spearing eels through holes cut in the ice. The occasional appearance of them in pools, and inland basins, is referable to their migratory propensity, which satisfactorily explains what the farmers have sometimes considered a phenomenon. We are assured that in extremely cold weather, they exhibit an electrical property.

It has been affirmed that the gastric juice of several fishing birds has no solvent power on the living eel, when swallowed; and it has moreover been asserted, on good authority, that it has been seen to make its escape uninjured, from the heron, after having been swallowed. Admitting this to be true, it will account, to some extent, for the universal distribution of this species of eel, not only over the New England States, but over the interior of this vast country. That birds convey the spawn of fishes, as they carry the seeds of plants, over the whole continent, is as certain as any fact in the range of natural history.

In the bay of New York, this eel has been known to weigh twelve pounds. The largest on record in this country, was caught in a bay of Long Island, and weighed sixteen and a half pounds. In Boston harbor they rarely exceed five pounds, though specimens are occasionally exhibited, a yard in length.

Eel fisheries are conducted on a surprising scale in some parts of Europe. In the Baltic, such vast numbers are taken, that they are salted for exportation. Two thousand have been caught in Jutland at one sweep of the net. Sixty thousand are said to have been collected from the Garonne, with one net, in a single day. With us, they are usually taken with a spear, or in an eel-pot, constructed something like a rat-trap. Being well baited with garbage, the eel squeezes through the door, but cannot return again. In this manner, bushels may be secured in a night.

It is not uncommon to have them take the hook, though few are thus caught. Usually, they are sold in the market, and neighboring towns, fresh, for immediate consumption.

While in a state of infancy, the dog-fish destroys immense numbers; even the skate, which is truly voracious, seems to form an alliance with the dull, anchorite lobster, for the mutual purpose of destroying the young fry of their worst enemy. This strongly borders on a spirit of revenge. As soon as the eel is fully grown, it seems to search instinctively and unremittingly for young skates, often not larger than a cent, and very gelatinous. The lobster, however, even in adult age, is particularly unfortunate once a year, when its shell comes off, in being exposed to the irresistible attacks of the eel's teeth.

When the lobster has the premonition that this process of shedding his coat of mail is about to take place, he endeavors to conceal himself in the dark recesses of the rocks, beyond the discovery of those who, like the ass in the fable, take pleasure in kicking the dead lion. Thousands upon thousands, however, are torn to pieces during the few days that they are without a shell. In about seven days another one is elaborated, and he again sallies forth in the majesty of his strength, putting to flight, by his very appearance, the rabble mob that sought his life.

GEN. CONGER.

Conger Eel, — *Muræna Conger.* Only occasionally found in the harbors, though the mackerel fishermen get them in deep water. One specimen only has been obtained by the writer, and that was unfortunately lost, by breaking the glass which contained it. Though pronounced fine eating, its color and shape are certainly forbidding. Some have been scooped up, weighing a hundred weight. The color is a yellowish white, mottled with dirty spots. The mouth and throat large, the neck thick, but soon becomes slender and snake-like. Teeth in both jaws. In the united dorsal, caudal and anal fin, there are said to be one hundred and thirtynine rays.

The specimen of which we are speaking was only about eighteen inches long, taken in the sea-grass, and very spiteful and active. Its lips were thick, and somewhat cartilaginous. On the whole, it resembled the blenny. Sir Humphrey Davy speaks of having seen the conger ten feet long.

Conger eels are occasionally obtained by the fishermen, six and seven feet in length, as large as a man's arm. However, on the coast of Massachusetts, such specimens are not so frequent as farther south.

A bill was reported in the Massachusetts Legislature, on Wednesday, March 13th, 1833, — (we have been particular as to the exact period, because it may hereafter be celebrated as an æra in legislation) "to preserve the eel-fishery at Muskeeket Island, in Nantucket." Surely, this must be considered the *ne plus ultra* of parliamentary wisdom, — enacting laws to prevent the extermination of a fish, infinitely more numerous than any other species, and which it would be utterly impossible to exterminate.

The City of Boston, with this precedent, ought at once to pass an ordinance in behalf, and for the preservation of the cod on the banks of Newfoundland,— and another, forbidding all good and orderly disposed people from supping on female lobsters, lest it should ultimately diminish

the number required in the literary emporium, by destroying the genuine breeders of this principal ingredient of a salad. But here follow some of the cogent reasons for this enlightened effort, which is destined to become so renowned in the subsequent history of our ancient Commonwealth.

It was stated, we understand, in the House, that fishermen from Cape Cod went over and caught a great many barrels of these fish for exportation. Mr Cole, a representative from O——, Barnstable county, remarked, says a gentleman present, that some ten or fifteen years since, an immense number of eels were caught in the coves at Orleans, and that he has known a *thousand bushels* to be taken, often, in a day. The practice was, after the toil of acquiring, to score the skins and hang the eels in the air till they were dried hard; then to take them down and split and salt them; after this, they were commonly *roasted* for family consumption, as occasion required.

Apprehension being entertained that these fish would be annihilated, at that place, if such great catches were allowed, an act was obtained to authorize the selectmen of the town to regulate the fishery, and now the permits range from three dozen to two bushels, for an individual, in a day, the proper season. Some of the eels taken there,

measure two and a half inches in diameter. So much for the notes of our obliging correspondent. The witty editor of the Boston Evening Transcript, however, the day after the ever memorable piscatorial triumph, goes on to say : — " A bill has passed the Senate, ' to preserve the *Eel* fishery at Muskeeket Island, within the town of Nantucket.' We like this. We are glad the *Muskeeket* interest is carefully looked after. Why should not eels enjoy protection as well as alewives and herrings? There are some provisions in the bill, which may be thought arbitrary, and perhaps be resisted by the Muskeeket democrats, if any of those odd fish are there resident. ' No person shall take,' says the act, ' from any creek, cove or harbor, on the Island, more than *three dozen* eels at one time, without permit of the selectmen, under penalty of *fifty* cents for each and every additional dozen so taken.' The Muskeekets and their neighbors are a shrewd and slippery race, and we venture to wager a *skin*, that no man, woman or child will take less than three dozen and *eleven*, provided they can catch so many. Besides, as they may take as many eels as they can, and skin and behead them as fast as they are taken, a question might arise whether having only the decapitated and skinless bodies in their possession, the law would hold them guilty of hav-

ing *entire* fishes, contrary to the statute. This may be a painful subject of consideration for the whole Court."

Mr Ruggles, of Barre, was one of those independent legislators, who conceived that there were too many ornithological and icthyological laws already passed. When the bill to restrain the taking of eels at Nantucket was under consideration in the House of Representatives, he concluded a speech, touching the momentous subject, with the following original doggerel :

> "Mankind have grown so wise of late,
> And rule so strict their wishes,—
> That legislators, short of work,
> Make laws for birds and fishes."

The poor pickerel, alewives, and Taunton herring, have undoubtedly felt a deep solicitude and sympathy for the long neglected eels, on which such a vast population have been feeding since the landing of the pilgrims, — but thanks to a humane General Court, *viri graves et docti*, of sad and learned men, those unfeeling Cape Coders are now restrained by the majesty of the law, to three dozen in a day ; enough, in all conscience, for a common man ; yes, the appetites of those monsters will now be regulated by the conservatory regulations of the conscript fathers of the town, — the selectmen !

It is to be regretted that the happy eels cannot be made thoroughly acquainted with the delightful intelligence, which gives them the privilege of multiplying *ad libitum*, — some convenient months in the year, perhaps the exact time when the honorable gentleman who originated the brilliant project, (probably *un connoisseur en anguilles*,) is from home, engaged in manufacturing statutes. There is nothing in this intellectual age, (*amicus curiæ*, the delighted eels may exclaim,) like having a friend at Court.

ORDER IX.—ACANTHOPTERYGII.

In this order are included several distinct families, the first of which, *Tænioides*, have long, thin bodies, with a dorsal fin the entire length ; but at present are not known to exist on this coast.

In the second, *Gobioides*, the fishes are distinguished by slender, flexible dorsal spines ; an intestinal canal of uniform calibre, and totally destitute of swimming bladders. The characteristics of each will be noticed as we progress.

FAMILY II. —GOBIOIDES.

GEN. ANARCHICAS.

Wolf-Fish, or Sea-Wolf — *Anarchicas Lupus*. In character, the wolf-fish is a voracious shark, being violent, and in proportion to its size, exceedingly powerful and quarrelsome. The average length is three feet, though there is not a season passing by, that individuals are not discovered over four feet. The skin is smooth, glassy, and of the color of sheet lead; but further south, the color is a light kind of gray, bordering upon a yellowish hue under the abdomen.

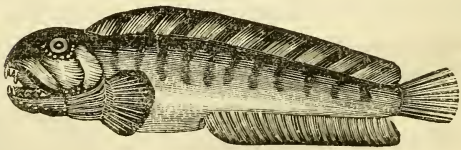
In July and August, when the water is so warm that they venture into the channels between the islands, there is a clearer whiteness of the skin on the belly than when drawn from deep water. Two large pectoral fins, strongly marked, close to the gills, and sharp, conical front teeth, projecting beyond the lips, will first attract the notice of the observer.

Within the first, is a second row of still smaller teeth, but they are rather irregularly placed, making about eighteen in the upper, and two thirds as many in the under jaw.

By another prominent appendage, the wolf-fish may be readily distinguished, viz; an upright,

broad, stiff and sharp dorsal fin, running the entire length of the back; and on the under side, the anal fringe reaches to the tail. In the tail are thirteen rays, and six in the branchial membrane. Within the mouth, the roof is mottled with dark, ferruginous patches; and the palate bones, farther inward towards the margin of the æsophagus, are set with molar blocks, approximating, somewhat, in configuration and structure, double teeth. With these the sea-wolf crushes clams, crabs, oysters, lobsters, and the bones of other fishes. These palatine enamelled blocks are sometimes found in a fossil state, and are called *toad-stones*, or *bufonites*.

THE SEA WOLF.



Usually, the wolf-fish is found in deep water, from a quarter to ten miles from the shore, principally on the feeding ground of the cod. When brought on deck, they erect the spines of all their fins, thrash violently with the tail, and bite whatever may be within their reach. Even in the wa-

ter they will snap most spitefully at an anchor, which they are passing, and when enraged, they manifest their ferocious disposition by repeated attacks on a chain cable. We have uniformly remarked that the fishermen call this the *cat-fish*, at the north, and even in this section of Massachusetts.

No use seems to be made of them, notwithstanding that vast numbers are taken. Even in baiting lobsters, which are so voracious that they feed upon almost any animal substance with which the trap may be loaded, this fish does not seem to be used. Yet it is reputed to be very good food. The Greenlanders eat it fresh, and also prepare it by drying; — smoked, they have the flavor of salmon.

When the population of the country is about ten times its present amount, a vast number of animals, now discarded from the catalogue of edibles, will necessarily be considered in the light of luxuries and indispensable necessaries. The skate is rejected here, altogether, on account of its hideous form, but in foreign countries it is regarded as a wholesome dish.

In the Levant, the cuttle fish, (*squid*,) is an article of extensive trade, variously prepared; and yet it is a horrible object, when fully grown, extending its flexible, worm-like arms in all direc-

tions, to grasp everything within its reach. In the marsh ponds before alluded to, in speaking of the neshaw-eel, at Martha's Vineyard, it is said there are an abundance of oysters, but of a quality that totally forbids their use. Necessity will probably hereafter compel people to eat them, and it is worth the while to institute some experiments with reference to that object. Were they transplanted to the mouths of rivers, and suffered to remain one or two seasons, it is altogether probable that they would increase in size, and become so totally changed in quality, as to be tender, nutritious and perfectly wholesome.

All the sources of profit and economy arising from the fisheries, are not yet developed, in this country, nor will they be, till absolute necessity obliges individuals to investigate these rich and unexplored resources of our country. From the squid, cartloads of which may be raked up in a day, at some particular places, the Chinese procure the material for manufacturing india ink; and the Sicilians, from the same liquor, prepare a rich valuable kind of soup.

When this creature is closely pursued, and there is no other way of escape, it spirts this black fluid into the water, which in a moment is so generally diffused, as to resemble a dark cloud, through which the pursuer cannot see, and thus the cuttle-

fish makes its escape. From the gall of several voracious families, a valuable water color might be prepared, in quantity equal to the requirements of the paper stainers. Isinglass, which is nothing more than the swimming bladder of the sturgeon, might be easily made from the cod, haddock and whiting, to answer the demands of the market.

Even the stomachs, well washed, and neatly dried, are no way inferior. And finally, the offals, as well as all the varieties of un-edible tribes, spread over barren land, either sandy, or cold, on account of their excessive humidity, are more beneficial, used as manure, than any other substance. The oily matter unites the particles of sand, and constitutes a kind of flooring to build vegetation upon; and in the other case, the heat evolved in the course of rapid decomposition, promotes the growth of whatever may be rooted in the soil.

FAMILY III. — LABROIDES.

An oblong body, covered with scales, is a type of this family; there is a single dorsal fin, considerably wide on some individuals, maintained in an erect position, by strong, bony spines; the lips are

fleshy, and the pharynx, set with either broad or sharp teeth.

GEN. TAUTOGA.

Tautog, — *Labrus Tautoga.* Within the recollection of gentlemen now living, the tautog was unknown in the harbor of Boston. A subscription was successfully undertaken for bringing several of them alive in cars, from Newport, Rhode Island, which were supposed the first of the species which had ever been to the eastward of the Cape.

It is very certain that the water in Boston harbor is altogether too salt for a variety of fishes, which are known to be very common on the south side of the Cape, in Long Island sound, and the waters contiguous to New York. The greatest variety is invariably found, where the largest bodies of fresh water are emptied into the sea. The mingling of the river and the ocean modifies the qualities of both, so that it is found, on careful observation, to be particularly favorable to the existence of classes that could not long endure the constitutional effects of either alone. Oysters are to be ranked among the orders that require a mixture of these two kinds of water.

No fact is better established than this, — that oysters do not propagate on a major part of the

coast of Massachusetts, though when brought from New Jersey, and thrown into the mud of the bays, they increase in size remarkably fast. In some rivers, a few miles from the ocean, the Medford, for example, in the neighborhood of Boston, oysters once abounded in considerable plenty, but circumstances have finally conspired to reduce them so much, that they are at present hardly considered to exist there at all. The tautog is one of the fish constituted for that mixture of salt and fresh water, and hence it will never flourish, where there are so few rivers as in the neighborhood of Boston.

Tautogs are highly prized, but the Boston market, allowed to be the first in New England, is but poorly supplied with them; whenever they are for sale, it seems to be the result of accident, as no particular effort is made to search for them exclusively.

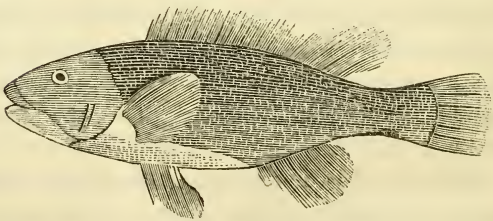
Before us lies a specimen, weighing seven pounds, washed on shore after a severe storm. *Tautog*, is a Mohegan Indian word, meaning *black*, and it is familiarly called *black-fish*, and *black-bass*. Several species are known in the southern market, viz: *L. T. fusca*, *L. T. rubens*, and *L. T. alia*.

To a lover of good fish, the exhibition of the tautog, as we have observed them in the New

York market, swimming at the moment of sale, must be particularly interesting.

As it respects color, the tautog, though denominated black, is in reality, a dusky, smoky brown, only really black on the back. The lips, lower jaw and abdomen, are of a dingy white; the mouth is small, and the lips thick, retractile, and exposing the front teeth, which project from the upper jaw; the two middle ones are large, but the remaining, as they run back, are graduated in size, becoming quite small. The tongue is white, pretty smooth, and closely embedded between the

THE TAUTOG.



bones of the jaw; the tail is entire, the middle ray being strong and stiff; gill cover smooth, without scales, and not serrated on the margin. Deep in the fauces is a cluster of broad teeth, for the obvious purpose of crushing shells; the back is considerably arched, and the belly prominent.

There are in the dorsal fin seventeen naked

spines, projecting their points above the web, and two spinous rays behind the vent.

Those who are best acquainted with the qualities of the tautog, will acknowledge that it is far from being handsomely formed. The projecting teeth, the narrow head, rolling lips and dorsal spears, are somewhat forbidding points; but the various ways in which the cook presents it, does away the first unfavorable impressions. It has long been esteemed a delicate, nutritious, finely flavored food, superior to most of the edible species in this section of the country. Baking and boiling are said to be the preferable modes of cooking it.

The tautog abounds in the vicinity of Long Island, near New York, and probably rarely leaves the salt water; like the sturgeon, and other anadromous fishes, it has not been detected in any of the rivers emptying into Long Island sound. In the vicinity of rocks, reefs jutting into the ocean, and over rocky bottoms, are the localities where the fishermen seek it. It is said, that in cars, the tautog may be fattened, and much improved in flavor.

After severe cold weather commences, it is a curious fact in the history of this fish, that a membrane forms over the vent, entirely closing it, and food is no longer required, — indeed they refuse

it, till the returning warmth of spring. When the dog-wood blossoms, (*cornus florida*,) in April, it is a sign that the tautog has a returning appetite; at least, this is the vulgar opinion. The New York fishermen, says the late Dr Mitchell, are governed in this respect by the chesnut leaves, when there are no dog-wood bushes in their neighborhoods.

> "When chesnut leaves are as big as a thumb nail,
> Then bite the black-fish without fail;
> But when the leaves are as long as a span,
> Then catch black-fish if you can."

A thunder shower, accompanied with lightning, is said invariably to disperse them from their accustomed places of resort, and a northeast wind is a sure indication of poor success in the sport of fishing for them.

In the New York market, we are informed that several varieties are exhibited, viz:

The *labrus tautoga fusca*, having bands and zones of a brown color; *labrus tautoga rubens*, with reddish hues, giving the fish a changeable color; and lastly, the *labrus tautoga alia*, mottled and clouded.

We are fully of the opinion, from our own examination in the market at New York, where all these varieties are sold, that the difference of complexion is altogether an accidental affair, depend-

ing on the age, or influence which the water, at particular localities, has on the skin, and that only one species exists in this or that portion of the country.

GEN. CORICUS, — CHOGSET.

BLUE PERCH, CUNNER, NIPPER, BERGALL, BLUE-FISH, and CHOGSET, — *Labrus Coricus, vel. Chogset.* Since the commencement of this little volume, no one species has given us more trouble and perplexity in the classification than this. It is admitted that it is wholly unknown in Europe, at least so far as respects the color.

Chogset is an Indian name, *Bergall* is the New York, *Perch* the Boston, and *Cunner*, its universal cognomen the further we go to the east. Sometimes it is ten inches in length, but usually varies from three inches to eight.

On this coast, it may always be recognised by its bluish color, approaching a dark green, varying however, by the manner in which the scales receive the rays of light. When drawn from deep water, the green evidently predominates. About the wharves, they are not as large as on the cod ground, weighing from three ounces, to about one pound. The fish is probably better developed here than at the south of the Cape, the water being both colder and salter, qualities which are conducive to its growth.

The mouth is small, lips readily turn back from the teeth, which are sharp, small and rounded at the base, being not far from sixteen in each jaw, projecting at different angles. On the back is one long, stiff rayed fin, which is erected or laid back at the pleasure of the fish, often troublesome, on that account, in disengaging it from the hook, as the fingers are sometimes severely wounded by the points of the spines, of which there are eighteen. The lateral line is not always distinct; gill cover in three pieces; caudal fin nearly square at the end, pectorals broad, strong, and armed with naked spines; and the skin covered with small, hard scales.

This fish is one of the most common on the atlantic coast of New England, taken in all weather and at all places, where the tide ebbs and flows freely, from spring till autumn.

This fish is the vexation of anglers, being always at hand to nibble the bait, and too ingenious and active in picking the hook, to be caught, unless the apparatus is well prepared for it. A small, twisted hook, well covered with the muscular part of a clam, is the most successful bait, and the fishermen should begin his operations on the first of the flood.

Millions on millions are scooped up in nets, very similar in construction to the metallic hoop-

ed purses. Being lowered in a still cove, where they are moving about in prodigious shoals, they rush into the bag to snatch at the floating food; as the man raises it he shuts the clasps, and thus draws a bushel into the boat at once.

To prepare these fish for the table it is customary to strip the skin off entirely, leaving the flesh white and delicate. For frying they are excellent. Boys are everywhere seen at the docks and on the bridges, about Boston, in the season, enjoying the delightful sport of drawing up the never failing perch. One cause of this great plenty, we apprehend, arises from the circumstance that other fishes are unwilling to molest them, on account of the dangerous effects of the spines.

It is pretended that there is a remarkable variety of the blue-perch, — having a reddish shade all over the body. For ourselves, we do not credit it; there seems to be a strange ambition influencing some of our naturalists, to discover new species, which never existed except in their own distempered imaginations. To all appearance, the perch or cunner is the tautog in miniature, and if it were black it would be supposed the young of that fish.

Weak-Fish, Squeteague, or Squetee, — *Labrus Squeteague*. Unpoetical as the name is,

the fish is much valued, though few seem to be taken to the north of Holmes' Hole. The teeth are tolerably strong, — the pharyngeal patches resembling grinders; the lips are thick and doubled; operculum without spines or scales; mouth wide, accompanied with fine labial teeth; two dorsal fins, in the first of which are eight rays; sixteen in the pectoral and seventeen in the caudal fin. The lateral line is continued quite into the inter-spinous web; nostrils double, and the lowest jaw the longest. Another name for the squeteague, is "*checout,*" of aboriginal origin.

We know of nothing particularly interesting in the character of this fish. It appears by the observations of fishermen, that it never visits rivers, but resembles in habits the tautog, being partial to similar grounds. Vast quantities are carried to the city of New York, where it is considered valuable, as a common small fish, though, like the blue-perch or bergall, it is presented of all intermediate sizes, from three inches to twelve. It is taken both by lining and seining, and because it makes such feeble exertion and resistance, in being drawn by a hook, it has received the appellation of *weak-fish.*

Spotted-Squetee, — *Labrus Sque. Maculatus.* This is nearly the same; if there are oth-

er varieties we have not succeeded in procuring them. The fins are somewhat brownish, and dark spots are indistinctly seen on the sides.

GEN. CRENILABRUS.

Blue-Back, — *Crenilabrus Merula*. This appears to be the *perca varia* of Dr Mitchell, which is an abundant and savory article at New York, and usually caught at Sandy Hook. It is only occasionally found in Massachusetts, under the name of the *blue-back*, in reference, probably, to its color. The length varies from ten inches to sixteen, having large scales, and undivided caudal fin. In the branchial membrane are eight rays; pectoral fin eighteen, ventral six, dorsal twentyone, anal eleven, and caudal seventeen rays.

A fish very similar, *crenilabrus lapina*, of the Mediterranean, is spotted in three rows, on the side, and at Sandy Hook, it is speckled with black and white, from the head to the tail. A difference in the quality of the water, in this instance, certainly gives the New Yorkers the advantage over us, in possessing an excellent fish, which, when it wanders into this vicinity, is not only changed in color, but rendered impotent and barren.

FAMILY IV. — PERCOIDES.

By close examination, it will be observed that the perches, says a writer to whom we are indebted for the discovery, have the dorsal and anal fin slightly scaled, and supported, anteriorly, by sharp spines, the foremost being sometimes folded back and concealed in the scales and dorsal furrow. The body is covered with scales, which are generally large in proportion to the magnitude of the fish; the intestines are large and provided with cœcums, but the swimming bladder is disconnected with the stomach by air ducts. The *sparoides* have one dorsal fin running the entire length of the back, but the *perseques* have two, or rather there is a tolerably well marked division between the spinous and adipose portions of the organ.

GEN. SCORPÆNA.

Major-Devil, Yellow Sculpin, — *Scorpæna Porcus*, [*Lin. vel, flava.*] Whether this outrageously ugly fish gets the name of *major-devil* because it presents a more horrible aspect than the cottus family, it is not important to inquire. Linnæus, in this genus, included fish with tuberculated or spinous heads, pendant cirri, and other cranial accompaniments, conducing to a truly horrible appearance.

The specimen before us is not far from fifteen inches long, — thick through the head and shoulders; gills enormous, gape of the mouth wide, lips tendon-like, fins broad and stiff, and the body of a dirty yellowish complexion, having the appearance of being partially coated with patches of short moss.

Shaw gives a vivid description of the scorpæna horrida, a native of the Indian Seas, which is so absolutely forbidding, as to realize to the eye all that the most vivid imagination considers horrible. At times we are inclined to believe the one before us a variety of that species. The margin of the lips are fringed with scolloped, membranous ribbons, hanging down and floating like oak-leaves, so that it would seem difficult to swallow, without drawing them into the mouth. We cannot explain their use, yet it is certain they subserve some important purpose. The head is large, covered with tubercles, broad bumps and depressions.

In the dorsal fin are twentynine rays; the first sixteen are stiff, but the remainder are of the character that would place the fish among the *perseques*. There are twenty rays in the caudal, fifteen in the anal, and three in the ventral fins; the gill membrane has seven rays. When the mouth is open, and put upon the stretch, as noticeable when

the scorpæna is first drawn from the water, the top of the æsophagus may be distinctly observed; the gills are bloated, the fins spread, and the writhing of its body, and snapping of its jaws, together with the singular appearance of its wrinkled, loose skin, apparently much too large for the body, actually shock the spectator.

There are infinitely more marvellous animal formations in the ocean than on the land; in some instances the departure from the ordinary laws of symmetry is exceedingly striking. In this case, we involuntarily associate the idea of horrible propensities, and actually excite a tremor of nervous disgust, by the mere power of imagination.

Scorpæna Scrofa, — having cirri under the eyes, and dangling from the lateral line, are sometimes taken in fishing in very deep water. All the specimens we have seen prove conclusively that they plough through the mud in search of shells, cuttle-fish, sea-eggs, as they are called, and the like kinds of food, and it is not improbable, that the leaves which float about the body so conceal it, that the appearance is that of a roll of weeds, — thus enabling the scorpæna more certainly and effectually to steal upon its prey.

Scorpæna Gibbosa, — another, by no means a distant relation of the family, with forked spines and broad pectoral fins, is also taken under similar circumstances. It would seem that they lurk about the feeding places of other more active species; and it is quite probable, that they are successful in seizing the cod, the gape of the mouth, even in those of ten inches, being large enough to receive the entire head of a good sized one. They could not swallow a morsel so large, but by killing the fish they might afterwards feed upon the carcase leisurely, in the dark regions where they are unquestionably organised to thrive.

GEN. MUGIL.

From the following characteristics, the tribe of mullets will be readily known, viz: "the head is depressed, broad and scaly," says Stark. "The ventral fins are under the abdomen, and there are two short, distant dorsal fins, of which the first or spinous, is further back than the ventrals, and the second answers to the anal; mouth with fleshy, crenulated lips, lower jaw with a carination in the middle, entering into a corresponding groove in the upper; no teeth; branchial membrane with three rays."

Besides having a rich grayish color, longitudinally shaded by brownish parallel lines, the abdo-

men is silvery, and the fins are tipped with a lively blue shade. Its figure is really elegant, there being a peculiar plumpness, and at the same time hardness, invariably indicating a delicate table fish. We have not yet obtained a mullet in the waters of Massachusetts, though we are assured one species does exist.

In the Literary and Philosophical Society's Transactions of New York, we find mention made of the New York mullet, *mugil albula*, having twelve or thirteen rows of scales on a side. Notwithstanding the minute description there given, we think that there must be some mistake, and our private opinion is, that no other species than the red mullet is a native fish ; yet we have been particular in the scientific description, that it may lead to further examination.

If mullets are ever detected on these shores, they are to be sought for in rocky localities, where the water is clear and pure. There are places where all experience teaches that particular tribes have a certain penchant, as the halibut for one, and the perches for another. Let the depredations be ever so flagrant on the colony's grounds, they are rarely discouraged, but endeavor to maintain their station by the mass of inhabitants, whose front is presented to the persevering enemy. In this re-

spect, they resemble, in habits, the gregarious wild cattle of South America.

Careful observation has confirmed the declaration of the old settlers on the shores of Lake Champlain, that one species of fishes is found on one side of the lake, and never, under any circumstances, on the other. Dog-fish, and others of similar properties, are the wolves of all inshore marine fishes, — forever prowling in the vicinity of such piscatory settlements, stealing and mangling the victims that accidentally fall in their way. At times, those marauders get the ascendency, by the destruction they make, — but the moment the citadel is taken, they forsake the premises, in search of another to wage war upon. As the dog-fish abounds at the north side of the Cape, it is possible thay have broken up the settlements which otherwise might be formed.

> "Deep in the wave is a coral grove,
> Where the purple mullet and gold-fish rove."

While contemplating the social character of certain families of the ocean, it has occurred to us, that some of them may actually possess the elements, if nothing more, of maternal solicitude for their offspring.

Naturalists, with one single exception, which will be presently considered, have not discovered

any degree of affection manifested by the female fish for her young. One is warranted in supposing that the *hassar*, of which Dr Hancock gives a glowing account in the 14th number of the Zoological Journal, belongs to an order vastly more civilized than those on this side of the Atlantic. "It is asserted by naturalists that no fishes are known to take any care of their offspring ; both the species of hassar, mentioned below, however, make a regular nest, in which they lay their eggs in a flattened cluster, and cover them over most carefully. Their care does not end here. They remain by the side of the nest till the spawn is hatched, with as much solicitude as a hen guards her eggs; both the male and female *hassar* (a species of Doras,) for they are monogamous, steadily watching the spawn, and courageously attacking the assailant. Hence the negroes frequently take them by putting their hands into the water close to the nest; on agitating which the male *hassar* springs furiously at them, and is thus captured. The *round-head* forms its nest of grass, the *flat-head* of leaves. Both at certain seasons burrow in the bank. They lay their eggs only in wet weather.

"I have been surprised to observe the sudden appearance of numerous nests in a morning after rain occurs, the spot being indicated by a bunch of froth, which appears on the surface of

the water over the nest. Below this are the eggs, placed on a bunch of fallen leaves or grass, if it be the litteral species, which they cut and collect together. By what means this is effected, seems rather mysterious, as the species are destitute of cutting teeth. It may possibly be by the use of their arms, which form the first ray of the pectoral fins."

GEN. SARMULLUS.

Red Mullet, — *Mullus Barbatus.* Red mullets have appeared, within the last few years, in the neighborhood of Boston, but not being at all prized, a few only have been exhibited in the market.

It has a sloping head, two cirri under the chin, three rays in the branchial membrane, and two dorsal fins; the eyes of the variety of which we are speaking, are wonderfully large, light colored and watery, — and out of all proportion to the body, which averages fourteen inches in length.

As the severity of winter increases, the surmullet seeks the shore; it is in winter, therefore, and only then, they are caught. It was one of the luxuries in the most corrupt age of Rome, to have these red fishes swimming in a vessel, under the tables of the opulent, that guests might enjoy the refined pleasure of seeing the color fade away, as

they slowly expired, when the water was drawn off.

A gentleman of our acquaintance, who ventured to put the prejudices against the *red devil* at defiance, and have it dressed for his tables, made a bad report of its edible qualities. He says it was both dry and tasteless, but there must have been some failure, first in the culinary operation, and secondly in the dressing. The exorbitant price the surmullet once bore, and the value still placed upon it by modern transatlantic gourmands, induce us to believe that its qualities in this country are poorly understood. At Savannah, New Orleans, and the Floridas, we are informed, it is very common, but know nothing of the estimation in which it is held.

GEN. PERCA.

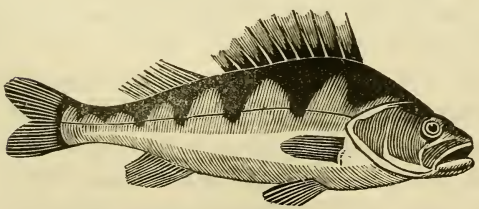
The snout is destitute of scales; the two dorsal fins very nearly of equal length; the gill-cover spinous; pre-opercula dentated, and ventral fins on the thorax.

Perhaps there is not another fish, with the exception of the eel, so universally spread over the globe, as the fresh water perch. It is delicate food, and therefore exceedingly valued. From the largest rivers, above the influence of tides, to the smallest rills, which trickle down the sides of the

lofty mountain, the perch is always to be found. They swim swiftly, keeping near the surface, feeding on flies and minute insects. In the lake of Geneva a female was caught, from which 992,000 ova were taken. This fact shows very clearly that it is marvellously prolific, yet not ten in a hundred of the ova arrive at maturity, being the food of others. To the Greeks and Romans this fish was perfectly familiar.

Common Perch, — *Perca Fluviatilis*. A beautiful fish, this, having an olive brown tinge, intermingled with a golden hue, — together with dark bands, transversely coursing the sides. The first dorsal fin is somewhat larger than the second, and marked posteriorly by a particular dark spot. All

THE COMMON PERCH.



the fins are tinged with a lively red, when first brought out of the water; the same color is also observed on the under edge of the gill membrane.

Silver Perch, — *Bodianus Leucos.* Having white and glittering scales, an arched back and prominent abdomen, even tail, a wedge-shaped head, good sized mouth, smooth tongue, lateral line partaking of the curve of the dorsum, yellowish fins, with seventeen rays in the caudal, twelve in the dorsal, six in the ventral, and fifteen in the pectoral. This little fish varies from three to eight inches in length, is found in New Hampshire, Vermont, Maine, and, in fact, in all the rivers, brooks and ponds in New England and New York.

Red Perch, — *Bodianus Rufus.* This is a little larger than the silver perch, and though denominated *red*, is really nearly black, after it has done spawning. Operculum serrated, the tail slightly forked, and the jaws and swallow set with fine sharp teeth. Usually, the three first rays in the anal fin are stiff, — very common wherever the others are found.

White Perch, — *Bodianus Pallidus.* With scales appearing like spots on the sides; fins yellowish, with the exception of the dorsal, which is brown; the tail is not forked; the middle portion of the gill cover rough and thorny; the two dorsal fins coalesce. Six branchial rays, fourteen pec-

toral, six ventral, nine dorsal, twelve anal, and twentyfive caudal.

Pond-Perch, is another common name in the country for the same fish; we cannot discover any kind of difference whatever.

Yellow Perch, — *Bodianus Flavescens*. Under favorable circumstances, for instance, in a deep, large pond, shaded by a thrifty growth of brushwood on the margin, the yellow perch attains a large size, and becomes elegant in its proportions. In the pectoral fins are fourteen, ventral five, anal twelve, caudal eighteen or twenty, and dorsal fourteen rays.

As long ago as in the year 1790, Dr Mitchell, of New York, conveyed three dozen of yellow perch in a churn, from Rockankama pond, in Suffolk, to Success pond, in Queens', a distance of forty miles, where they had never been seen, and from that period to the present time, they have continued to multiply and keep the water amply stocked. In our humble view, the yellow fins of the silver perch, entitle it to the name and rank of the one before us, — and further, we believe they are one and the same thing, — the trifling difference of color depending on circumstances, repeatedly adverted to in various other places. The love and ambition of subdivision — the longing to be

the creator of new genera and species, has introduced more confusion into works of natural history, than can be expurgated in fifty years of common sense to come.

The universal distribution of this family has led to some curious hypotheses of the manner in which the ova were dispersed. About fifty years ago, all at once, perch were discovered in all the lakes in Ireland, and in the Shannon.

Mr Clinton quotes the remark from Gmelin, that ducks may swallow the eggs of fishes and eject them again, unhurt, so that they will afterwards come to maturity. Adanson, in Africa, observed small fishes, in morasses formed by recent rains, which were red, and lively. Whenever the water was evaporated they died, and after a new rain others appeared like them. Within six or seven years, early walkers discovered on Boston common, one morning, an immense number of live fishes on the grass. In this case the wind had an agency.

Dr Hosack, many years since, had an artificial pond excavated in a botanic garden, which to the utter surprise of everybody was speedily supplied with little fish. All these instances of the spontaneous birth of fish are not so very miraculous as would at first appear. Birds are the unquestionable agents in the transportation of the ova,

either in their own bodies, or sometimes by actually carrying the body of a dead fish, filled with ova.

Ponds may be successfully stocked by carrying the eggs in water. The Chinese practise this profitably. Fish may be transported from country to country in a jar of water, if careful to change it occasionally on the voyage. An electrical eel, which we have before noticed, in this way was brought to Boston from South America, alive.

The following fish belongs to the fourth division of the family *Percoides*, distinguished by irregular teeth, a branchial membrane with seven rays, opercula dentated, or set with some sort of spines, — and lastly, according to the system of classification we are pursuing, should be grouped with the *Perseques*.

Striped Basse, Rock-Basse, — *Perca Labrax*. [Lin. Sciæna Bloch.] On the sides are parallel lines, like narrow ribbons, eight in number, which give it the name of striped basse; the scales are large, of a metallic lustre; in the operculum the middle plate is serrated; the last portion of the third plate, the gill cover, constituted of three pieces, has two nearly concealed spines.

In the branchial membrane are seven rays, pectoral sixteen, ventral six, dorsal eight in the first, and fourteen in the second, anal fifteen, and in the caudal seventeen; some of them in each fin according to the size it would appear of the individual, are stiff or spinous.

Three or four of the stripes reach the tail,—the number not always being constant; and the remainder gradually disappear at different points on the abdominal walls; the eyes are white, the head strikes one as being long, and the under jaw, as in the pike, juts beyond its fellow. Next to the mackerel, this is decidedly the handsomest of the native fishes.

Basse, says the late distinguished De Witt Clinton, is a Dutch word, signifying *perch*. The resemblance between the fishes in Lake Erie, and those in the Atlantic is so striking, that they must be referred to a common origin. It cannot be true that our inland fresh water seas were peopled with aquatic beings when the deluge subsided. That some of the lakes may have received inhabitants in that way we should not attempt to deny; but that there has been no other mode of stocking them is so unphilosophical, that it would greatly embarrass a man to maintain an argument to that effect. In this same Lake Erie are found the *rock-basse*, and the *white basse*, a fac-simile of the

striped basse of the ocean ; yet nothing would be more difficult than to hold a water communication with the sea. Even the *herring*, supposed to require salt water at least some part of the year, is a steady resident of this lake.

Our remarks on the probable manner in which eels are distributed over the country, will also explain the mystery of these Atlantic fishes being in fresh water, equally developed, and obviously *climated*, — because the species have not become deteriorated, — birds have doubtless been the agents in transporting the spawn.

Striped basse are a sea fish, but principally subsist near the mouths of rivers, up which they run as high as they can conveniently go. During the approach of winter, instead of striking out into the deep water of the open ocean, like most other anadromous species, the basse finds a residence in ponds, coves, rivers, and still arms of the sea, where, undisturbed and comfortable it remains till the following spring. The principal rivers in the state of Maine, as the Penobscot, &c., are the places where they are now taken in the greatest abundance, and of the finest flavor and size. In all the rivers too, of Massachusetts, they are also found, at the inclement season of winter, but the fishery is not so productive as in Maine, whence the best in the Boston market are annually brought.

It is thought that the basse remains more constantly on the coast, through the year, than almost any other fish, being taken in every month, but most valued in the keen, severely cold weather of winter. They weigh from three to fifty pounds.

A striped basse, weighing forty pounds, was taken by a colored servant on the banks of Harlaem river, a little south of the bridge. The fish was discovered by the man from the end of the dock, which projected some distance into the river. At times he would sail gently along past the dock into quite shoal water, but how to capture him was the question. No net, or hook and bait was at hand, and as the golden opportunity might not last long, our hero resolved to encounter him single handed in his native element, and at a favorable moment he leaped from the dock directly upon his back. The affrighted fish darted from under him as though a shark was in pursuit, and as luck would have it, took a direction for the shore, and ran up nearly high and dry into the mud. Before he could get fairly afloat again, and have plenty of sea room to make his escape, the colored man seized him by the gills, dragged him upon the beach, and secured his prize.

Not many years ago there was a strange and fatal epidemic raging among the basse in Boston harbor. Great numbers floated towards the navy

yard, at Charlestown, much swollen, and speedily putrescent after coming to the surface. Whether some deleterious matter from the common sewers of the city poisoned the water, or whether a contagious disease was propagated from one to the other, could not be ascertained. That a small quantity, comparatively, of poison, may be so generally diffused, as to exert a deleterious influence on aquatic life, has been conclusively proved in the case of the sinking of a small cargo of lime, which caused the death of an incredible number of fishes. That epidemics occasionally prevail in the ocean, appears to be admitted, proving exceedingly destructive to particular species.

Judge Davis intended to have presented us some remarks on a great mortality of the fishes in and about the old town of Plymouth, many years since, but we have unfortunately not yet received them. When the new volcano of Graham's Island appeared between the island of Pantellaria, and Seiacca on the southwest part of Sicily, distant about thirty miles from either place, in 1831, the havoc the heated water and sulphureous vapor made among the fishes, was indeed extraordinary. Millions of them were seen, for miles around, floating on the tops of the restless waves, either dead, or in the last agonies of death.

By what authority Dr Mitchell gave his own

name to the striped basse, "*Perca Mitchilli*," we cannot divine; he might with equal propriety have tacked his name to the white shark, or the bones of the mastodon, and the last would have savored less of vanity, than the affixing his cognomen to a common table fish, known from time immemorial, all over Europe. These remarks are not made in a spirit of envy, nor with a disposition to be disrespectful towards the memory of an eminently distinguished American naturalist.

We have not succeeded in procuring a single specimen of the "*Perca Mitchilli Interrupta*," of that author, nor one of the "*Perca Mitchilli Alternata*," which are laid down in his communication to the New York Literary and Philosophical Society. And the *black-harry*, or *hauna-hills*, or *blue-fish*, on which considerable labor has been bestowed in the description, though successfully sought near Sandy Hook, does not appear to have an abiding place in Massachusetts. One old fashioned basse, only, whose stripes are sometimes black and sometimes blue, at one time dotted, and at another presenting interrupted lines, according to the season, or its physical condition, is known to us from Cape Cod to Maine.

"If," says Governor Clinton, "the whole world contains one thousand species of fish, as is said, it is not unreasonable to suppose the United States

and their dependencies contain between three and four hundred." We fully assent to the opinion of the probable number of species, but, so far from consenting to the supposition that four hundred of them live upon the Atlantic coast of the United States and the inland waters, we confess our belief is that the number will fall far short. Nature has been bountiful beyond the deserts of the country, in natural productions, but we are too apt, in the love of home, to over estimate its comforts — not that we would be understood, as it regards their value to ourselves, but as they would be estimated by the stranger.

Our coal mines are no better than those of England, our metals are neither more abundant nor purer; the birds in America are not more musical than on other continents, nor are the fishes more various, or of a superior quality; all our writers on natural history have fallen into an error, we apprehend, in multiplying species unwarrantably, — which will not only subject us to ridicule, but also retard the advancement of true scientific knowledge, by requiring the industry of future writers to correct old and deep-rooted errors.

GEN. URANOSCOPUS.

Uranoscopus Scaber, — Among the singular productions of the ocean, this fish must be regard-

ed as one of peculiar ugliness. Its hea pis in shape like a square block, being larger than all the remainder of the body, having protuberant eyes on the top, looking nearly upward; the lower jaw juts out beyond the upper, giving the idea of a grinning expression; on each side, over the shoulders, is a strong spine; the fins are small, compared with its other dimensions, — and the anal is prolonged, soft and greasy to the touch.*

Though it is only about one foot long, the diameter of the head, through the articulations of the jaws, is five inches, in a living state. The color borders on a dirty gray, and is considerably

* "Nothing is made in vain, ————"

In the year 1825, a vessel from Europe, bound to Quebec, struck against some loose ice, in consequence of which she sprung a leak, somewhere below water, which entered so fast as almost to defy the utmost exertions of the crew to keep the hold clear. Just as they were on the point of taking to the boats for safety, the leak was discovered to have suddenly stopped; and getting the ascendency, by renewed efforts, the pumps were found to suck. Every person on board was astonished, nor could they account for the very sudden check given to the great force with which the water had entered but a moment before. A few days after brought them into port, where, on examination, a large hole was found beaten through the plank, in which was a live fish, exactly filling the orifice, and this saved the ship. It was supposed that the fish was sucked in by the water, rushing into the hull, and being too large to pass through, and unable to extricate itself, there remained till liberated by its grateful benefactors.

loose and shrivelled. At the corners of the mouth are threads, and small cirri or tendrils hanging from the tip of the under lip. It is destitute of a swimming bladder, and therefore must be confined to the mud, where we imagine it passes the time in snatching the smaller fishes that happen to come within reach of its dilatable mouth. We have only one specimen, taken in deep water, in fishing for cod.

Web-Fingered Gurnard, — *Trigla Palmipes.* Dr Mitchell found also the sea-robin, (*lineata,*) at New York, but we have never detected it in Massachusetts. There are fleshy filaments attached to the skin, just under the lower fissure of the gills, before the pectoral fins, which have given it the name. At their extremities they are like the fine threads of a tassel. Over the head there is a coat of mail, quite rough. On the middle plate of the operculum, there is a sharp bony spear, directed backward, and the posterior is notched like two saw teeth. On the walls of the chest are two broad shields of bone, also armed with thorns ; and from the eyes are two others, ending near the dorsal fin. A mottled olive is the prevailing color, but the abdomen is delicately white ; and interspersed here and there are spots of red. The pectoral fins almost equal those of the flying

fish, being stretched on long, hard rays, projecting beyond the inter-spinous membrane. The anal fin is of a dusky yellow. In the branchial membrane are six rays, in the pectoral fourteen, ventral six, dorsal nine and fourteen, anal sixteen, and caudal fifteen, rays. It is very ugly to the eye.

GEN. COTTUS.

This genus is characterised by a head thicker than the body, beset with occasional spines, generally flattened horizontally; the first dorsal fin spinous, and separated from the second, which is near the tail, and soft; the pectoral fins are broad, large, strong, and powerfully, and sometimes dangerously exerted on the fishermen's hands. They are found in salt and fresh water, and live considerable time out of the water, in the shade. Those from the ocean are less tenacious of life than the others. If irritated, their heads appear to become enormously distended with air, which is drawn in by the gills.

River-Bullhead, — *Cottus Gobio.* This fish is universally known all over New England, and we imagine, all over the continent, existing in all latitudes. The body is of a variable olive color, approaching a dark yellow, and on the back nearly black. On each side of the head is a long

sickle-shaped spine, sharp at the point, familiar to youth, who, in the interior, have great enjoyment in catching them.

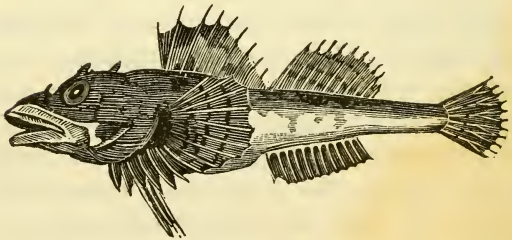
Some of them exceed a foot in length, but the average in New England, is not far from seven inches. One would hardly, at first, discover the difference between the *pout*, before mentioned, and the *bullhead*, though they are totally unlike.

Sea-Bull, — *Cottus Quadricornus.* This fish resembles the sculpin, but has the addition of four short spines, rooted in the cheeks, below the eyes, lying nearly flat to the face, and pointed backward. Both pectoral and dorsal fins are broad and large, and tinged with red. It is found along the whole coast, — also in the Baltic and Mediterranean. It is also taken in the Duno in Livonia, and the Dalerou, in Sweden. With us, the usual length is eight and ten inches. The ground-work of the color is yellow, patched over with red and dark brown spots, and it is called, familiarly in this part of the country, the *four-horned sculpin.*

Sculpin, — *Cottus Scorpius.* In England this is the father-lasher, figured exceedingly well in the old works on icthyology. *Sculpin* is a familiar name for the family, derived, most likely, from *scorpæna*, or *scorpius.* The head is large, and

so are the fins; stiff rayed, and the body marbled over with yellow and smoky patches, which, in reality, are beautiful. There are two spines on the gill cover, and two short ones, also, near the eyes. It never appears very active, but lies on the shoal bottom, and as the tide ebbs and flows, seems to take advantage of it.

THE SCULPIN.



The fins, when in that quiet state, are fully spread, and should a baited hook be passed within a few feet they leisurely swallow it down. They are the pest of saltwater fishermen. As food they are not esteemed. They abound in Europe, Newfoundland and Greenland; they are able to maintain a long combat with a small shark by bristling up their spines.

ARMED BULLHEAD,—*Cottus Cataphactus.* Neither does this differ so much from the others as not to be instantly recognised as a sculpin. If the

head is wanting in some of the spines and warty excrescences, so forbidding in them, it has a compensation in the development of horny bumps, like the crusts on a rhinoceros, and a dingy yellow skin, marbled much like the preceding.

On inquiring of the aged fishermen to whom we showed the specimens, they were particularly familiar with them under the names of *ruper sculpin*, *horn sculpin*, and *toad sculpin*.

GEN. BATRACHUS.

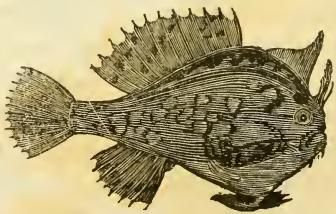
Grunting Bullhead, — *Batrachus Grunniens*. Its name originated from the circumstance of its making a grunting noise as it comes out of the water, which is effected by the prodigious inflation of the gills and side muscles of the mouth, similar in office to the buccinators. The mouth is small, with minute, almost concealed teeth; but in the fauces are large molar blocks, constituting a crushing mill, of a powerful order. A whitish color predominates, shaded by dark bands.

In the branchial membrane are seven rays; seventeen in the pectoral fin, six in the ventral, seven in the anal, nineteen to twentyfive in the caudal, and ten in the first, and twentyfour, ordinarily, in the second dorsal; under the tip of the lower lip are cirri. About the length of the sculpin.

GEN. LOPHIUS.

FROG-FISH, MOUSE-FISH, ANGLER, BELLOWS-HEAD, and SEA-DEVIL,—*Lophius Piscatorius*. We were fortunate in procuring a specimen of this monster, but it was subsequently destroyed by vermin, in the process of drying. It was taken near Cohasset rocks, on the tautog fishing ground, by a pleasure party from Boston. The head was enormously large, but the body slender and tapering, and four feet long. When the jaws were open it could receive a morsel as large as a man's head.

THE FROG FISH.



Separately from the fins, it resembled a colossal tad-pole or pollywog. The skin was roughened by warty excrescences of a clayish blue color, and snug over the body, but loose over the head; the eyes were large and dull. Many threads were projecting from the sides and angles of the mouth, short and flexible, and at their ex-

tremities bulbous. There were two long rays behind the upper lip. In fact, the dorsal fin commenced by another ray, somewhat solitary, several inches from the last, towards the tail. Only a few rays were given for the support of the two dorsal fins, which appeared to have been torn; indeed, it would not be difficult to make three distinct dorsals. The pectoral had twentyfive deeply lodged rays, enveloped in a fleshy, reddish mass, like the meshes in the palm of a child's hand; in the branchial were five on each side, at considerable distance, allowing the gill to be spread out like a dust-pan; the caudal had eight; the anal ten, and under the belly were loose, fleshy appendages, of a roseate color, covered by an elastic, gelatinous tissue, which are called *flippers*. Both lips, as well as the jaws, were stocked with sharp, conical teeth, of unequal length, and in the swallow were patches of another kind, but apparently thrown about without much regard to order.

Where the body joined the head, although that measured over four feet in circumference, it did not much exceed the diameter of a man's arm.

Old writers, to whom the fishing frog was known, assured their readers that the cirri were fishing lines, and the bulbous extremities were the baits, which nature had provided for its use in angling. Buffon, who relates some strange facts of this fish,

says it lies concealed in the weeds, allowing the lines to float above its head, which so much resemble a favorite species of marine worms, that the fishes being deceived by them, are successfully decoyed into the capacious vortex which is open to receive them.

That the sturgeon practises a similar method seems generally admitted by naturalists. Pliny goes still farther by allowing the little fishes to "*swallow the bait,*" when the concealed dragon draws them in by shortening the line. Dog-fish are mentioned by some writer, as their favorite food, which, by the way, we are right glad to hear, as they are the robbers and murderers that keep many species from visiting our shores. When the intestines are taken out and the shell of the head dried, it becomes diaphanous, in which condition boys put a candle inside, and make use of it as a scarecrow lantern.

Perhaps in fishing six months another might not be caught, so that they may be considered as prone to concealment. From the nature of the organization of the viscera, it is certain they are destructively voracious; confined to deep, dark, muddy bottoms, and never disposed to wander far from localities which yield a tolerable subsistence.

FAMILY V. — SCOMBEROIDES.

The scales in this family are almost imperceptible, on account of their smallness. Usually, the adipose portion of the dorsal and anal fins are thickened by the scales, anteriorly; the membrane of the rays behind is slender, and sometimes wanting in some genera. Cuvier divided the family into four tribes, characterised by the structure, rather than the position of the dorsal fins.

Chub-Mackerel, — *Scomber Grex.* This is the same fish called *thimble-eyed* and *bull-eyed* mackerel, to the south of Cape Cod; to the north of that point of land, for some reason which we cannot explain, it rarely makes its appearance, though abounding at New York. By a round, gently tapering body, waving lateral line, a dark green color on the dorsal surface, and a variegated, changeable color on the sides, when first caught, like feathers on a pigeon's breast, it may always be known.

In the Literary Transactions before referred to, we find that in the years 1781 and 1813, all the bays, rivers, creeks and coves were crowded with this species, which has, since those memorable periods, been comparatively scarce.

In the branchial membrane are five, pectoral

nineteen, dorsal nine and twelve, anal thirteen, and caudal twentythree rays, though not invariably. Probably age adds to the strength, and in fact completes the growth of some of the soft rays.

Spring Mackerel, — *Scomber Vernalis.* We have long been in doubt about the existence of this fish, but on the whole, conclude that it really differs from the common mackerel. In the first place, it is truly beautiful, being elegantly proportioned, from ten to sixteen inches in length, and two and a half, or thereabouts, through the shoulders; waving stripes of a rich blue, emerge from the dark color of the back and wind under the abdomen, where they are lost; the interstices between the bands are of a changeable red, mixed with green; the caudal fin is forked, and spreads either way to the extent of more than three inches, supported on the outer edges by spines.

On the ventral fins, early in the spring, are clouded blackish spots; the eyes have a night or nictitating curtain, moved over the cornea it would seem, as in birds. We are not, however, precisely certain that this is the fact. Only a very few of these visit the shore further north than Salem and its neighborhood. There are six rays in the branchial, seventeen in the pectoral, five in the ventral, ten or twelve in the dorsal, twelve in the

anal, and from eighteen to twenty four in the caudal.

YELLOW MACKEREL, — *Scomber Crysos.* Only six inches in length, and two deep at the thickest part; said to be on the coast, though we have not procured a specimen, but taken in the bay of New York, and at Newport, &c. Rhode Island.

HORSE-MACKEREL, — *Scomber Plumbeus.* On the authority of the late Dr Mitchill, we notice the existence of this little fish, thirteen inches long, with a name that is associated with the idea of something large enough to swallow a horse. Not a single specimen could be procured last season, in the vicinity of Boston.

SPANISH MACKEREL, — *Scomber Maculatus,* so called by writers, and the banded-mackerel, *scomber zonatus,* are minutely described by Dr Mitchill, but after a tedious and satisfactory examination, we are fully persuaded that the doctor was deceived by the soft rays and the accidental difference of color, at different seasons of the year, and that there are not so many varieties of the mackerel as he imagined. If at any subsequent period we change this opinion, in a future edition we shall certainly be honest in confessing it.

Mackerel, — *Scomber Scomber.* This common fish has a head compressed and smooth; the body is also smooth; the lateral line carinate; has several spurious fins, oftentimes observed between the dorsal fin and caudal. Twentytwo species are thought to be known to icthyologists, distinguished by having or not having spurious fins; those which have the spurious, are divided into those having them distinct and those having them connected together.

Three species are found near Massachusetts by the fishermen. Occasional stragglers are probably taken, but are not recognised as such.

The common mackerel of commerce is certainly one of the most beautiful fish in our waters, so familiar, that it is almost needless to describe its figure. It has, till very recently, been supposed that the mackerel was a migratory fish, retiring, towards winter, to the polar regions, where it protected itself from the intense cold, by keeping under the vast mountains of ice. Lately, it has been asserted, but on rather doubtful authority, that this fish remains on the coast through the year, imbedded during the severity of the winter, in the soft mud but a few leagues from the coast.

The following subjoined letter to the author, from Capt. Couthouy, a highly intelligent navigator of Boston, not only on the subject of their

migration, but on other controverted points among naturalists, will in some measure settle the point in question.

At Sea—passage from Cadiz to Boston, Jan. 1832.

Dr Smith —

Dear Sir, — Believing that any information, however humble or limited, respecting the habits and peculiarities of fishes, will, in consequence of your present occupation, possess some interest for you, and also mindful of the request you made last summer, I take the liberty of sending the few observations I have been able to make this voyage. I regret that owing to the hurry of preparing for sea, I omitted informing you according to promise of the time of my sailing, in order to be furnished with large bottles, &c. for the preservation of specimens — since, though I have taken a great number of fishes, the greater part have unluckily been lost for want of means of preservation.

I have, however, saved the following,—two species of remoræ; one of the pipe or file fish; a fine specimen of the monoceros, one of the largest I ever saw; and a very singular worm. Of the remoræ, the common or black one was taken from a large shark we caught, to which it adhered for some time after he was on deck. The striped one was attached to the monoceros, and is, I think, the male, as the black one is the female, of the species; the stripes, which the liquor has turned nearly white, were then of a brilliant yellow, the body of an uniform dark ash color. At the same time there was one adhering to the heel of the rudder, of similar appearance, but near five feet in length; he remained there several days, although the vessel was sailing at the rate of six to seven miles the whole time; but all attempts to capture him proved fruitless.

The pipe fish appears to be a variety of the species brought you last summer, the most remarkable circumstance relating

to it, is its having been taken in a small pond of fresh water, fifty miles from sea, and where no salt water ever came. I imagine it was transported thither by some sea-fowl, which swallowed it while in the ovum, and subsequently deposited it in this pond. The monoceros was taken with a bucket, at a time when a number of large sharks were around us; it is a very stupid fish, suffering itself to be knocked several times with the bucket, without attempting to remove; the sharks also frequently rubbed against it, but it paid no attention to them.

The worm is the first of the kind, I have ever met with; it was found in a living state, in the maw of a flying fish which came on board, but whether it was taken for food, or preyed upon the fish itself, I could not determine. At the time the monoceros was taken, as above mentioned, there were great numbers of dolphin swimming among the sharks with perfect familiarity; and although the latter were so ravenous that we took five of them from seven to twelve feet long, they did not manifest the slightest disposition to molest the dolphins; a circumstance which confirms me in the belief I had long entertained, that the stories of sharks catching dolphins were merely fabulous.

The shark holds about the same position among fishes, as the vulture among birds — excessively greedy, but seldom attacking any thing but carrion. Another reason for this belief is the difficulty of a shark's seizing any object above him, in consequence of the upper jaw projecting so far beyond the lower; a conformation which obliges him to turn over, in order to secure his prey. Any fish, during this act, could make its escape with ease. Man does so with less readiness, because, being out of his element, he cannot manage himself with so much facility. I would here mention that one of the sharks was entirely different from any which have before come under my observation, and might be called a most beautiful fish, possessing none of that clumsiness of shape or motion, which is characteristic of the species; but by no means inferior in vo-

racity, of which he gave us ample proof. He was nineteen feet or more, in length, our stern being eighteen feet across, and his head and tail projecting considerably on either side. His color on the back, was a brilliant purple, which became gradually fainter towards the belly, where it was a pure white; the pectoral and dorsal fins were much smaller than in the other species, and the tail not so perpendicular, it being in most of them, thus—

while this was more horizontal, and tapered more gradually in this form—

the head also, instead of being flat and semicircular, like the rest, was long and pointed in somewhat this manner—

the eyes were of a bright green hue. He stole about thirty pounds of meat from the lines, while we were trying to noose him, in which, however, we finally succeeded, and I had already in imagination, placed his head in a barrel of pickle, in order that it might, at some future moment be submitted to the philosophic investigation of Dr J. V. C. S., when owing to the peculiar formation of his opposite extremity, the noose slipped over it, and for aught I can tell, he may yet be hurrying off as fast as his fins will permit him.

If your patience is not too far tested already by this *long* fish story, there is another circumstance which may be interesting to you. I am not sufficiently versed in icthyology to be positive, but believe it to be generally understood, that the mackerel which disappear from our coasts in the fall, run to the northward, and remain during the winter under the ice. I have not the presumption to assert that this is not the case, but leave you to judge how far the following facts may go to disprove such a position. On the 10th Nov. 1831, we were sailing at the rate of five knots per hour to the northeastward, when we were passed by an immense shoal of mackerel, swimming in a southeast direction. They first came in sight about 10, A. M. and continued passing till after 11. They would not take the hook. There were hundreds of dolphin in pursuit, by whom they were sometimes driven almost on board.

This was in lat. 44° north, long 39° 30' west. Supposing its progress to have been at the rate of six miles per hour, which it must have been at least, the shoal was about seven miles in extent from northwest to southeast — their breadth was far as the eye could discern on both sides.* On coupling

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* The following extract is a corroboration of Capt. Couthouy's remark, that they go in immense shoals.

"This fish," says the Newburyport Herald, of 1831, "was never more abundant in our bay than on Sunday, Monday, and Tuesday of this week. A solid shoal of miles in extent, lay outside of our harbor, within twelve miles, and gave incessant occupation and fine sport to a large fleet of mackerelmen. The number of craft engaged was supposed to be about three hundred. We have already stated that one vessel took, in a single day, seventy barrels. On Wednesday, the shoal had disappeared."

"A mackerel, three feet ten inches long, and measuring eighteen and a half inches round the body, was caught in Severn River, near Round bay, on Saturday last, and was ser-

this with the facts, that in the early part of May, 1829, in about 19° north lat. and 48° west long., I passed a large shoal swimming to the northwest, and their making their first appearance on our coast to the southward, I am inclined to believe that in lieu of going to the northward on the approach of winter, as generally imagined, they on the contrary quit our seas for those of a more temperate clime.

Again, is not their extreme leanness when first appearing with us, a natural consequence of their long and fatiguing passage? I am wholly ignorant whether they have been seen in more southern climates, except in the instance I have mentioned, but if they have not, I think it may be reasonably supposed that they swim deep to avoid the havoc which would otherwise be committed in their ranks by the fishes of prey, which in those seas abound near the surface.

How far the facts stated justify such an inference, you are the best judge; they are certainly singular and novel; — it is to be lamented that in general, those who have the most frequent opportunities of investigation, are apt to regard such occurrences as hardly worthy of notice; as a habit of observation and remark, would no doubt be the means of elucidating many doubtful or disputed points.

And now, requesting your indulgence for this long and I fear tedious letter, my only excuse for which, is the motive with which it was written.

I remain, very respectfully, your obt. servant.

Jos. P. Couthouy.

I will just add, though you are already, perhaps, aware of it, that the male dolphin may be easily distinguished from the

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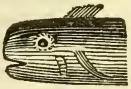
ved up at Wilson and Swan's Hotel, on Sunday. A delicious dish it was."

We are told, but on what authority we are totally unable to divine, that the mackerel has a strong predilection for human flesh. In the Mediterranean, the famous article called *caviare* is manufactured from the roes.

female, in the water, by the shape of its head; that of the former being abrupt, and almost perpendicular, thus —



while the female's is more rounded, thus.

Yours, &c. J. P. C.

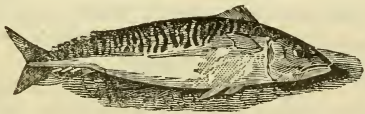
Certain it is that in the spring they make their appearance in vast shoals, scarcely inferior, as it regards numbers, to the herring — being many miles in extent. From some cause not yet understood, the common mackerel appears to be constitutionally subject to a disease of the *tunica conjunctiva*, the skin covering the eyes.* This membrane seems to thicken, during the winter, to such a degree, as apparently to obstruct the entrance of the rays of light to the retina; but as warm

* *Effects of lime upon fish.* — As a barge laden with lime was proceeding up the Ouse from Lewes, from some cause or other, it sunk near Barcombe. The effect on the fish in the river was instantly manifested; hundreds rose to the surface, and a great number were taken by hand. Pikes were seen darting about in great agony; and most of the finny tribe within a mile of the spot where the accident occurred, were rendered blind from the burning nature of the lime. It is calculated that some thousands of fish perished.

weather approaches it sloughs off. The color of the mackerel is altogether beautiful, and it may, in this respect be considered the Adonis of the sea.

Commonly, in length, it is about ten, and from that to fourteen inches. It has dark blue, transverse stripes, from the dorsal fin, elegantly shaded with a rich tinge of green. On the male, the stripes are nearly straight, but on the female wavering. Numerous black spots are noticed on the sides, fading into a splendid golden green, that cannot well be imitated by artists.

THE MACKEREL.



In the catalogue of edible fishes, this has maintained a high rank from remote antiquity. The ancients manufactured from the mackerel a sauce, in universal estimation, called *garum*, which was little else than the pickle, in which they were preserved. The same article still holds an elevated rank at the fashionable tables of Constantinople.

Surely, the mackerel fishery of Massachusetts, now exceedingly extensive, must be reckoned one of the most important branches of business, giving

employment to thousands, who could not contribute to the general prosperity of the state in any other way.*

The thousands of barrels annually exported to the West Indies, give peculiar activity to our commerce.

THE SURMULLET, — *Mullus Surmuletus*, a variety of the mackerel, was held in the highest possible estimation by the Romans, those princes of good living. Pliny says that a Roman Consul paid for only one of them, a sum equal to $216,68, and Suetonius furthermore re-

* The following is the number of barrels of mackerel packed in this state during the last twentysix years. The halves are reduced to whole barrels.

1804	8,079½	1818	47,210
1805	8,936½	1819	105,433
1806	8,473	1820	236,243
1807	10,904½	1821*	111,009½
1808	7,738½	1822	160,294½
1809	8,865½	1823	145,006
1810	13,058½	1824	191,650½
1811	19,632	1825	254,381½
1812	5.018½	1826	158,740½
1813	3,832½	1827	190,310½
1814	1,349	1828	237,324½
1815	12 ts.16,349½	1829	225,882
1816	30,021	1830	308,462
1817	37,982		

* The first year after the division of the States from Maine.

lates that one of the Emperors, at an æra of ostentatious luxury, gave for three surmullets, 30,000 sesterces, which is $1065,60 cents.

The markets in Constantinople are liberally supplied with this fish, under the royal appellation of *sultan balik.* A variety of the surmullet is found to the south of New York, and sometimes there, which is familiarly known to fishermen as the *short mackerel.* These are often poisonous, which results, most likely, from the substance on which they have been feeding. The following notice in a New York paper, of the last season, is confirmatory of this assertion.

" Families are cautioned against eating a species of small mackerel which are now selling in our markets. Seven of the writer's family, yesterday morning, were affected in a way which leaves no doubt as to the fact of their having been poisoned. Each individual was variously affected, according to the quantity eaten. The face and whole body became flushed, and in a short time the complexion resembled the color of mahogany. The head was also affected, and sickness at the stomach and vomiting succeeded in two or three instances; in others medicine was administered. The pupils of the eye dilated, and then swam as it were in liquid; the body also became swollen. No serious consequences ensued, though an individual is still con-

fined to her bed. As the writer has since heard of another instance of similar effects being produced from eating this fish, there is no doubt as to the cause which produced it. The effects were visible a few minutes after the fish was eaten."

The mackerel, with all its beauty, is decidedly stupid, in many respects. A red rag, or a bit of paper tied to the hook and rapidly trailed from a boat, affords delightful sport. We actually wonder that the worshippers at the shrine of honest Izaak Walton, who cannot angle for trout in the ocean, do not turn their attention to mackerel chases in our beautiful harbors.

GEN. THYNNUS.

Tunny, — *Scomber Thynnus.* Occasionally the tunny is taken in baiting other more common fish. They do not run in shoals, on this coast. Sometimes they have been seen ten feet in length, but on this shore they oftener fall short of two feet, than exceed it. They may be known by a *hissing*, or cutting of the dorsal fin through the water, while running with great swiftness. They sometimes pursue the mackerel, which they devour voraciously.

In this place they are not frequently eaten, being so scarce that their quality, as food, is not commonly known. Pliny, the naturalist,

gives an account of a shoal of tunnies, so vast that the fleet of Alexander the Great, could scarcely maintain its course. The ships were arranged in battle array, to force the extraordinary aquatic phalanxes to give way to the conqueror of the world.

The tunny will be recognised by its dark blue back; silvery sides, and the gray color of the first dorsal fin, and the darker gray of the tail. Its spinous fins have a yellowish tinge.

GEN. CENTRONOTUS.

Pilot Fish, — *Centronotus Ductor*. To mariners, this frequent attendant on vessels is well known, and is the theme of many fore-castle tales. It has a light blue colored body, with wide transverse bands of a deeper and beautiful shade, four dorsal spines, a forked tail, and varies in length from six to eighteen inches.

In a recent publication on natural history, it is positively asserted that two of these fishes, some years ago, accompanied a ship from the Mediterranean into Falmouth, where they were taken in a nest. This was an unfeeling and ungenerous act, after they had travelled such a distance.

Sailors are very confident that the pilot fish swims before sharks, to conduct them where to commence a slaughter, but this is altogether gratuitous; but that they are much in their bad com-

pany, is very true, but then it may be with the expectation of nibbling at the remnants of the feast.

With the most determined perseverance, they will keep within a few feet of the hull of a ship, night and day, for weeks together, as though they were actually on business. Whether this arises from a feeling of safety, while in company with a vessel, a love of wandering, or a hope of plunder, cannot be determined.

GEN. ZEUS.

Common Dory, — *Zeus Faber*. Three species, the hair-finned, rostrated, and bristly, *zeus capillaris*, *rostratus et setapinnis*, are known in the waters about Long Island Sound, New York, but the common dory is the only one of the family which has been detected in Boston Bay, so far as known to us. It is a thin, broad fish, fashioned somewhat like the fresh water bream, with sloping head, and a body of a yellowish color, having a black patch each side, large as the thumb nail. From the middle of the back over the shoulders, long, slender, thread-like spines, three or four inches long, are given off, which, when the fish swims fast, are laid nearly flat. Farther back little spikes of bone are presented above the skin, and at the commencement of the dorsal spine are

forked spines, — the first being long and semi-flexible; the anal fin is similar, the tail forked, like the mackerel.

There are other marks, such as two long, slender, brush-like fins, under the throat, and pouting lips, the under being a trifle the longest. The black spots are said to have been given it by St Peter, as in the haddock, by the pressure of the thumb and finger. Another vulgar notion is this, that St Christopher, in wading through an arm of the sea, having caught a stray dory, left on it the marks of the grip which he gave. Quin, the celebrated English comedian, is said to have brought it into repute as a luxury, in his day, though it is now neglected. Its usual length is not far from ten inches.

GEN. CHRYSOTOSUS.

Moon-Fish, — *Chrysotosus Luna.* Within the last few years, some of these splendid fishes have been brought into port by homeward-bound vessels. During long and tedious calms, within a day's sail of Boston, Newburyport, Salem, &c. the moon-fish has been taken with a hook, — sometimes measuring six feet in length. The body and tail are flat, oval, without perceptible scales, short snout, and destitute of teeth.

There are six rays in the gill membrane, the

first portion of the dorsal fin is pointed and high, but the middle part of it short. A silvery green is the prevailing color, but in a certain position, golden, with azure tinges, are seen, and then, as though there was a particular design in beautifying it, though only occasionally seen by man, well defined white oval spots are dotted along the sides.

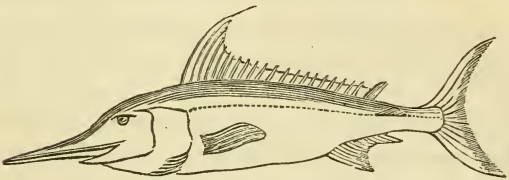
Much as has been said of the splendor of the mackerel, the moon-fish is really, to our apprehension, the Adonis of the sea. We have not seen a single specimen in spirit, in any cabinet in this country, those brought on shore being usually first placed in pickle, and afterwards dried, which ruins the color.

GEN. XIPHIAS.

Sword-Fish,—*Xiphias Gladius.* Two species of the sword-fish have been discovered, but only one of them is known to exist here, which, by way of eminence, is called the great sword-fish. The snout is long and flattened, resembling a dirk; the first dorsal fin, commencing just back of the shoulders, is high, and particularly elevated anteriorly, but gradually slopes off towards the tail, where it presents merely a sharp ridge above the back, and then suddenly rises into a point again; some of the first rays are spinous. The anal fin

is short and pointed ; the tail lunated, the color of the body a sort of brown, running into a bluish shade, but on the abdomen, the skin is white. As

THE SWORD FISH.



before remarked of some preceding fish, this is evidently possessed of a highly irritable disposition, and therefore appears to be constantly involved in perilous and fearful difficulties ; it is voracious, and yet without teeth ; and though it seems to be the knight errant of the deep, by meddling with the affairs of others, in which it has no personal interest, it also appears, at other times, to be at open war with whatever moves in the same liquid element.

Whales of prodigious magnitude, though truly peaceably disposed, if by chance they get within the sphere of its vision, are butchered without mercy ; whenever the sword-fish fails of accomplishing the death of this great animal, it is oftener because the sword is not long enough to pene-

trate through the thick sheet of blubber to the vitals, than from any want of exertion on the part of the warlike assailant.

Mariners assure us, that on making our coast, it is no uncommon circumstance to see this fish, six, ten, and fifteen feet long, playing about the vessel. We have been inclined, at times, to suppose that the *makaira*, or lesser sword-fish, also inhabited these waters, but no specimens having been procured to establish the fact, we have concluded that the young of the gladius are the little ones adverted to by seamen.

We have had an opportunity of conversing on the subject with several intelligent vineyard pilots, particularly Mr Dagget, an aged man, who has pursued his adventurous business nearly half a century, to whom we are indebted for all the accurate knowledge we possess of their history in Massachusetts.

Instead of being rare, they are certainly numerous, and some of them of tremendous power. They are sometimes sought, successfully too, for their flesh, which is considered a wholesome, nutritious food, much superior to common fish. Mr Dagget remarked that he salted it down in barrels for retailing.*

* Let a man do what he will, if he is honest and industrious, the labor of his hands is not only profitable to himself,

Very recently this same gentleman procured a magnificent one, the head of which, with its sword, upwards of four feet long, was neatly prepared by Dr Yale, of Holmes's Hole, by whom it was forwarded to Boston. There are times when they appear unusually numerous; and then again, several weeks perhaps will pass by before they are seen again.

On a calm sunny day, during the last summer, as a pilot was leisurely rowing his little skiff over the glassy bosom of the gently swelling waves, he was suddenly roused from his seat by the plunge of a sword fish, thrusting his long spear more than three feet up through the bottom of the slender bark; when the pilot, with that presence of mind for which the whole fraternity are distinguished, broke it off on a level with the floor, by the butt of an oar, before the submarine assassin had time to withdraw his fearfully offensive weapon.

but of real utility to others. The truth of the observation is finely illustrated in the following extract.

"In the garden grounds along the river Sitter, in the Canton of Appenzell, Switzerland, such numbers of snails are kept for fattening, that the noise of their dentriulated jaws, are heard several paces. Sometime before Lent, they are packed in casks, and sent to the convents of Suabia, Bavaria, Austria, even as far as Vienna, where they are sold as luxuries. By this traffic, some have acquired handsome fortunes."

Within five or six years, a Boston ship, on a return from a long voyage, being overhauled for repairs, presented the stump of a sword-fish's blade, the point of which was driven a considerable way into the hard oak. In repairing his Britannic Majesty's ship Leopard, in 1725, on her return from the coast of Guinea, a sword of this fish was found to have gone through the sheathing one inch, next through a three inch plank, and beyond that four inches and a half into the firm timber. It was the opinion of mechanics, that it would require nine strokes of a hammer, weighing twentyfive pounds, to drive an iron bolt of similar size and form, to the same depth in the same hull; yet this was accomplished by a single thrust.

The Hon. Josiah Robbins of Plymouth, related to us the following extraordinary fact. On the return of the ship Fortune, of Plymouth, from a whaling voyage, in the Pacific, some time in the year 1826, or 7, he does not recollect which; the stump of a sword-fish's blade was discovered on the outside of the hull, which, on examination, was found to have penetrated through the copper sheathing, an inch board sheathing, a three inch hard wood plank, the solid white oak timber of the ship, twelve inches thick, through another two and a half inch hard oak ceiling-plank, and lastly perforated the head of an oil cask, where

it still remained immovably fixed, so that not a single drop of oil had escaped.

We are enabled by these relations, to form some tolerable idea of their amazing muscular power. The late Sir Joseph Banks was informed by an East India Captain of a fact equally interesting; the sword was driven its *entire length* into the solid wood of the ship, but the extreme violence of the shock instantly killed the enraged fish. The block, sawed out of the hull, containing the imbedded instrument, is still exhibited in the British museum.

On the coast of Brazil, the sword-fish attains its greatest dimensions, being found twentyfive feet long. Ship-carpenters do not view the circumstance of finding points and portions of blades in vessels a rare occurrence, and more particularly in those from South America.

We have many specimens of the swords, from various parts of the world, but two only possess the skeleton of the head, which renders them quite valuable to a cabinet. Seamen, who bring them from foreign parts as curiosities, are very apt to ruin them in two ways, viz: first, by sawing them off too far from the jaw; and secondly, by scraping the blades smooth with knives and glass, by way of improving upon nature; hence a majority of the specimens in museums are nearly ruined.

The blade, as it comes from the fish, is between three and four inches wide, at the base, depending on the proportions of the individual to which it belonged, tapering to a sharp point; the edges are rough, like a coarse file, not cutting, but calculated rather for tearing; the upper surface is ash-colored, convex, and covered by an epidermis, or scarf skin, also rough to the touch, like sand paper. The under side is lighter colored, freër from roughness, and less convex. A smaller fish is found in the southern states, whose under jaw is terminated in a sword, in character and use precisely like this; how either of them feed is a question which remains to be answered.

FAMILY VI. — SQUAMIPENNES.

Members of this family are known by the scales mounting the soft portion of the fins, and by the peculiarity of the teeth, which are very much like short bristles, irregularly crowded together.

GEN. SESERINUS.

Seserinus Alepidotus. Though quite rare, whenever taken, it will be recognised by the blue

color of its body, forked tail, and oval form. The body is wide and thin, the little teeth, hardly perceptible, are sharp, in one row; the scales are also so small that a glass is required to observe them distinctly; the first spines of the anal and dorsal fins are hooked forward towards the head; and instead of ventral fins, there are two slender bones; and beside, two lateral lines on each side.

FAMILY VII. —FISTULARIDÆ.

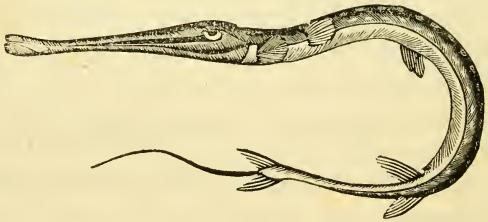
The characteristic of this family, is a long, semi-transparent tube, formed by the extended ethmoid bones, bones of the partition of the *nose*, and others of the head, covered with a prolongation of the skin; and at the extremity is the mouth. The body is long, slender, and delicately formed.

GEN. FISTULARIA.

Tobacco-pipe Fish, — *Fistularia Tabacaria.* Had we not two excellent specimens of this fish, taken near Holmes's Hole, its existence would not have been credited so far to the north of the equator. Those before us, now under examination, are upwards of eighteen inches long — and from the caudal fin, a single hair runs off one foot fur-

ther, giving an entire length of two feet and a half. The body is smooth, the jaws narrow, scales minute, fins tinged with red near their joinings ; one dorsal fin opposite to the anal, and both are near the tail, which is forked ; in the branchial membrane are seven rays.

TOBACCO-PIPE FISH.



As it respects the habits of the tobacco-pipe fish, we have no means of gaining a knowledge. None have been seen excepting those which have been driven on shore in storms. In South American seas, they are larger, and between three and four feet in length.

END OF PART FIRST.

TROUT AND ANGLING.

PART SECOND:

ON

TROUT,

INTERSPERSED WITH REMARKS

ON THE

THEORY AND PRACTICE OF ANGLING.

TROUT AND ANGLING.

THE State of Massachusetts may be said to abound in that highly esteemed and well known fish, the *trout*, which is unrivalled, either as an object of gratification to the palate of the epicure, or as contributing to the innocent sport of the angler. Every ingenious device which has been practised in other countries to lure this wary, yet bold and voracious fish, has been adopted in this, and with equal success. In treating of them, the subject of angling is necessarily introduced, since all the works which have been published in England, and all well known in this country, upon fishing generally, give them a preëminence over every other, as being most worthy the pursuit of the scientific angler.

In Great Britain, trout are divided and subdivided into many varieties, and it is not impossible there may be as many in this country; but as it

is often difficult to settle these shades of difference, on account of the supposition that they are capable of hybridous productions, it is sufficient to know that there are but three principal varieties in this state.

These are *pond-trout*, *river* or *brook-trout*, and *sea-trout*. The two former being such fish as live exclusively in fresh water, and the latter, such as live, a great part of the year, in that which is salt or brackish, ascending the streams as spring advances, and returning to their native element so soon as the spawning season is over.

There are but few natural ponds or lakes in this state which contain trout, for it is that which is found in natural ponds, which we denominate pond-trout, and not the more common fish which is generally found in artificial mill-ponds, and which closely resembles such as are found in the brooks and rivers, which being flooded form the ponds. The species referred to are found in Winnipisseogee Lake, in New Hampshire, whence they are often brought to market in a frozen state, but are in no estimation for the table, the flesh being white and quite tasteless. They are taken only in the winter through the ice, but seldom or never by the usual method of angling.

These fish are doubtless natives of the lake in which they are found, and like others of the same

species, congregate in winter in its deeper waters; feeding upon the surface, as the weather grows warm and the season advances, and depositing their spawn in the still shallows of the rivers which flow from it. Their spots are large, faint and dark. Their shape is long like the mackerel, but without its symmetry, and their average weight from three to five pounds.

Though what we denominate, more strictly speaking, pond-trout, have no red spots, there may be some exceptions, even among such as are found in natural ponds. But their distinction as a species, is indicated by their never attaining the same weight. For instance, in the town of Belgrade, in the state of Maine, there are two ponds united by a river, called Long Pond and Snow's Pond, the latter of which flows into the Kennebec, where the trout are of a very beautiful description, as it respects their form, bright vermilion spots, and the pink-color of the flesh. They however do not grow to a very large size, yet much larger than the generality of brook and river trout.

These fish are not often caught in the ponds above named, but as the spring advances they are taken in the river which unites them. Warm weather drives them back into the deep waters of the ponds again, whence they return in the autumn to deposite their spawn, at which

time they become too easy a prey to the angler.

There is another variety peculiar for its bright red spots, in the town of Sandwich, in what is called the Upper Pond. This is supplied by springs, but it is difficult to say whether the fish are indigenous to the water or not, for although the water is cold, and therefore congenial to their habits, yet they may have originally come from the sea, and changed their nature from being confined to the pond, by the obstructions upon the stream which runs from it; this may be said of many other ponds and the effect of confinement and change of food, is that of rendering the flesh soft and muddy to the taste.

It has been remarked that the larger the water the longer the fish, and also that wherever trout are found, there are few of any other kind of fish. This arises from the fact of their requiring a colder temperature than suits the nature of most other fresh water fishes. In fact, according as the water is cold, the flesh of the trout is firm and high flavored. In Enfield Pond, in the state of New Hampshire, there is a very large growth, which in this and other waters of the same size, have been known to attain the weight of ten or twelve pounds; here as elsewhere, they are never taken but in the winter through the ice, a method which

affords no sport to the true angler, as requiring no skill, and is despised accordingly. Into this pond, the pickerel, sometimes called the fresh water shark, has been introduced, and the result has been that the pickerel gained the ascendency and exterminated the trout in a very few years.

The same thing has been practised in a number of ponds in the state of Maine, and the same result has followed. It is remarkable that on the west side of the Penobscot river, the ponds are mostly filled with pickerel, while on the east side they are as generally stocked with trout; this must arise from some particular quality or temperature of the water, nature having placed them in that which is most congenial to their habits, and necessary to their perpetuity.

In treating of the fish now under consideration, it was intended to confine our remarks to such as were found in Massachusetts alone, but as it has been before observed, there are few ponds in this state, or if any, not well known, which contain the pond-trout as a distinct variety. We have alluded to such waters in the neighboring states as are well known to afford the subject of our illustration.

They are found of immense size in the Schoodic Lakes, but larger still in proportion to the extent of the waters, in the great Moose-head Lake.

In both these they are only taken in the usual way, through the ice in the winter season. Perhaps no attempt has ever been made, but could these "monarchs of the deep" be taken by the regular angler, aided by all the devices so essential to the true enjoyment of his sport, the pleasure resulting from the success of his achievement, would be proportioned to the size and strength of his captive.

The possibility of taking a very large fish, (though not a trout) with the rod and line, has been settled by the performance of Col. Thornton, mentioned in "Daniel's Rural Sports," who caught a pike in one of the Lochs in Scotland, which weighed fortynine pounds and a quarter. He was prepared with trolling apparatus to take this very fish, which was known to be in the lake, having at a previous time carried off a hook. It required one hour and a quarter to exhaust his strength, and on being safely secured in the boat, a scar was perceptible where the hook had escaped through the skin. It is said that the trout of the great western lakes attains the enormous size of one hundred pounds.

The largest that we know in the state of Maine, are found in the Moose-head Lake. To confirm this fact, it is known that a fish was found dead upon its shore which weighed fifty pounds,

having been suffocated in an attempt to gorge another of a large size, which protruded from its mouth. The flesh of all these overgrown fish is described to be coarse and unpalatable.

Of all the ponds or lakes which have been adverted to as containing the primitive trout, there is no one so well known or so much resorted to by the ardent angler, as Sebago Pond, near Portland. As early as March, in the spring of the year, these fish emerge from the deep, and therefore warmer water of the lake, and enter the Songo river, in pursuit of their favorite bait, the smelt, — at this time they may be taken in great numbers with the rod and line. The attempt would be fruitless to succeed in the pond itself, at this early season. It is customary, therefore, by those who make this visit so early in the year, and whose love of the sport prevails over the necessary privations, to encamp upon the margin of this tributary river. The number of such, however, is small, but as the season advances, and the fish have receded from the river, and dispersed themselves over the whole lake, rising and feeding upon the various insects which float upon its surface, the angler approaches with a better prospect of comfort, if not success. His equipments are a long stout salmon rod, with rings upon it as usual to guide the line, which is made of silk and hair, woven together, and eighty

or a hundred yards long. He has a brass reel or winch, upon which the line is wound. The winch is not a *multiplying* one, but *single*, and attached to the butt of the rod, the end joint of which is short and stout; other spare joints are contained in the butt of the rod. His hooks are large and well tempered, of the size best known as mackerel-hooks, and they are attached to double and twisted *gut*, upon which a weight, about the size of a musket-ball, is made by loops to fasten on at pleasure.

His pocket-book is well furnished with all the materials necessary for the prosecution of his sport, together with such implements as are required to repair that derangement of his apparatus which in fishing is always likely to occur. Only one thing more is added to complete his gear, (for artificial flies have seldom or never been tried,) and that is, a net with a wide bow and a short handle, or a gaff which answers the same purpose, to land his fish, when, after being sufficiently exhausted by *playing*, they are ready to take in.

Thus equipped, the angler visits Sebago in the month of June. If he is a lover of nature, there is much to admire, not only in that densely wooded scenery which generally surrounds our inland lakes, and is so striking in this, but also in those little quiet fairy islands which here and there break the glassy

monotony of its surface. Notwithstanding the fact that the artificial fly has seldom been used by the frequenters of this lake, it does not follow that the practice of fly-fishing would not be attended with the same success, which attends the act as practised without exception upon the various waters in England and Scotland. There is reason to think so, from the well known fact that, differing from the trout of various other ponds, they live and feed near the surface of the water — at least, this is known to be their habit in the summer time, and it may be stated still farther, in confirmation of the probable success which would result from the use of the artificial fly, that the insect, familiarly known as the beetle or daw-bug, is often found on examination to have been their food.

Since then it is not fly-fishing, trolling may be considered the usual method of taking the fish in this pond. *Trolling* is a term which is generally applied to fishing for pike, but it means nothing more or less than moving about either with a dead or live bait from place to place, and fishing upon the surface, in distinction to fishing in deep water, and confined to one spot. In this pond it is customary to fish from a boat, which is slowly moved through the water, either by the help of oars or a sail. If the former, the fish take the bait at a greater distance from the boat, being alarmed

by the motion of the water; in this case it is necessary to uncoil half the line, but if a sail is used, a shorter line is sufficient.

But though the greater number of fish are taken from a boat while moving through the water, many are also caught at a favorite resort, on a rocky shore of the pond called the "*images.*" This well known spot has been the scene of many a festive meal, and often have the caverned rocks reverberated to the sound of the joyous angler's mirth.

Though very little can be said in favor of the quality of the Sebago trout, as a delicacy for the table, still ample amend is made by their unrivalled activity on the hook, which is in the highest degree exciting to the angler. When struck, they instantly bound from the water to the height of many feet, plunging and leaping alternately, in the vain attempt to disengage the hook, but good management, and a "steady hand which feels him, yet still to his furious course gives way," subdues his strength at last, and the unwilling captive, floating on his side, yields as a trophy to the angler's skill.

It has been before observed, that their food, more particularly in the early spring, is the fresh water smelt; but in summer, there are various other *small fry*, such as the shiner, and minnow,

which yield them sustenance. It is therefore an object to obtain these small fish; — if alive, so much the better, but as it often happens from the state of the weather, or some other cause, that *live bait* is not to be procured, recourse is then had to a small slip taken from the most shining part of the fish itself; this, if not so *killing*, is for the reason stated, the bait which is generally used for the Sebago trout.

It may be here remarked, once for all, that the success of the sport, like all fresh water fishing, very much depends upon the state of the weather, and its influence upon the water. For though at times there seems to be an unaccountable caprice in their habits, yet how common it is, at that season of the year when nature is dressed in her gayest attire, when the air is filled with fragrance, the field with flowers, the grove with music, and the heart with delight—when the balmy south wind generally undulates, without agitating the surface of the lake or stream — and above all, when "from the bosom of yon dropping cloud" a gentle rain descends — how common a thing it is to hear the ardent angler, his feelings responsive to the charms of nature, exclaim, "What a glorious fishing-day!"

A few years ago, on a visit to this lake in the last week of May, the season being backward, the water and the weather cold and unpropitious, there

was no such thing as taking a fish, but having proceeded farther to the eastward, and revisiting the lake after a lapse of ten days, the result was such as might be expected from warm weather and a more advanced season. On this occasion the average number taken in a day, by the party of four, which ransacked the lake in a boat, was near twenty-five, the weight being from about two to five pounds each.

Very erroneous opinions are formed of the weight of these trout. They are generally exaggerated; and this may be said of them wherever they are found, but as it respects this pond, though it is not uncommon to take them of six, and occasionally of twelve pounds, yet it was the opinion of the celebrated Mr White, which has been confirmed by our own observation, that considering the prevailing number of small fish, they do not average over a pound and a half each through the season of fishing. This remark may strike some with surprise, who have told a very different story, founded perhaps on their individual good success. The truth is, they have degenerated not only in size, but numbers, owing to various causes, unnecessary to detail.

Not less erroneous, than that which respects their weight, is the opinion entertained by some, that these fish were originally salmon, but being

pent up and confined to the pond, by the various obstructions in the river which forms its outlet to the sea, they have changed their form, assumed the spots, and become trout. If the fact were to be settled merely by the color of the flesh alone, there might be some ground for the notion, for it is redder than any salmon's ever was, but with this exception there is no other striking resemblance between them. And as it is believed that the various shades of color peculiar to the trout, are the result of some chemical action, arising from the varieties of food which they eat, it may hence be inferred, that had they ever been salmon, a change of color would have been quite as likely to result from their transition from salt to fresh water, as well as a number of other transformations which are said to have taken place. As well might it be said that a trout on entering the sea, would turn into a salmon.

It may be remarked in addition, that the color of which we are speaking is not confined to the fish of this lake only. In no other respect then are they salmon, than as being individuals of the genus salmo, may render them such.

Neither are they exclusively *salmon trout*, as *all* of the species may with propriety be so denominated. Indeed it is doubtful if in this country that particular variety is known which corresponds with

that described as the salmon trout of England; in fact, no two authors agree upon the subject. Since then, those of which we are speaking, possess the obvious qualities of their species, to say nothing of the more scientific arrangement established by naturalists, by whom the trout and salmon are classed as *distinct* species,— since they possess neither the form, the fat, the flavor nor the projecting excrescence of the under jaw, peculiar to the male salmon, since the longitudinal line as well as the spots are more clearly defined,— we may, however our minds have harbored a doubt that a whale is a fish, as safely arrive at the conclusion that a trout is not a salmon, as that "fleas are not lobsters."

With the exception of a few observations, which apply to the species generally, our remarks thus far have been mostly confined to the variety which we denominate the pond-trout; we proceed now to speak of the second description, viz:—the brook or river-trout, considering them as strictly a fresh water fish. And in this class, we mean to include, as before observed, such as are found in the artificial ponds, as well as the running water by which they are supplied, for they are precisely the same fish, differing only in size, in which the pond-fish have generally the advantage, since they are less *approachable*, and not so effectually *thinned out* as the trout of the streams. They may be

considered the common trout of the country, and abound in all parts of the state, being most plentiful however, in such streams as have the fewest obstructions. There is a great similarity in their appearance wherever they are found, and in size much less variation than is generally supposed.

One scarcely ever hears of a brook, but at some time or other the largest trout has been taken from it that ever was seen. And further, — there is scarcely a brook or river, but there is sure to be *located* at a convenient distance from it, some veteran angler from the *old country*, who enjoys the undisturbed monopoly of its finny treasures. He scorns the vulgar bait. He enjoys the sport, and exults in its success, according as it requires an exertion of his skill, for the more the art "is reduced to a complete science," the greater is the pleasure which he derives from it.

There are not only the individuals of whom we speak, but others, who, availing themselves of all the information to be acquired from books and experience, are fully aware that fly-fishing is the perfection of angling.

They import the best *tackle* from England, for it is not to be bought in all its variety in this country, including a stock of artificial flies, which are more particularly considered *standards*, for it would be useless, (our streams being, a part of the year,

" in icy fetters bound,") to include such as are designed, in England and Scotland for each *particular month.*

A pocket-book, not only well supplied with artificial flies, but with such materials, particularly feathers, as enable him to repair his losses, and imitate nature upon the spot, is an important article of the fly-fisher's equipment; his rod, however, deserves the first consideration. The wood is hickory; it is twelve and a half feet long; it has but three joints, which are ferruled only on one end for the sake of lightness; the butt is solid, very large in the hand, and tapers very suddenly; into the end of it a spike of five inches in length, thin like a knife, is made to screw, for the purpose of supporting the rod upright in the ground, as this is a position in which it is least exposed to danger; the length of the spike is required to give it firmness in the ground in which it is thrust, which is often of a sandy or mossy nature — finally, when put together, it weighs but thirteen or fourteen ounces without the spike, and may be held all day at the extremity, or, as some prefer, above the winch, without the least fatigue, and is under as much command as a coach-whip. A reel or winch is indispensable; it should be such as is called *multiplying*, with which advantage is taken in exhausting the fish, by winding up the line with greater

rapidity, whenever it becomes relaxed. The line should be about thirty yards long, and made of patent silk and hair, either of a green or gray color; smaller lines, made of that indispensable material, *gut*, are also necessary; these are called "*casting lines*," and sometimes "*foot lengths*," and are attached, as occasion may require, to the principal line, for the purpose of falling with less violence upon the water. A line made of hair, or silk and hair wove together, is preferred, (indeed no fly-fisher ever uses any other,) on account of its not becoming heavy and saturated with water, like lines of silk and other materials, which cling to the rod, when wet and swelled, fall with violence when the fly is cast, and are not delivered freely through the rings of the rod.

There are some small materials which may prove convenient, all duly noticed in every book on angling, such as the clearing ring, the landing hook, &c. The fish pannier, which should be of a middle size, and the landing net, are however indispensable. The handle of the latter should be made of the lightest wood, about five feet long, and the bow of the net about twelve inches in diameter.

The landing net is carried under the left arm, and beside the use for which it is designed, of landing the fish, it often proves serviceable in

sounding the depth of a bog, or breaking the force of a fall.

Having thus described the most material parts of the angler's apparatus, we proceed to say, that success will depend upon the expertness with which the fly is *cast*, and this it would be in vain to attempt, in the *teeth* of even a gentle breeze. He must take advantage of the wind, and if it blows *from* him, the fly may be cast to a distance with great precision. Much depends on practice, and to some it has proved a *knack* very difficult to acquire.

Two flies are generally used, termed technically, a *dropper*, and a *stretcher*, the latter being at the extremity of the line, and both made to remove at pleasure, by a simple arrangement of the *casting line*. The trout of which we were speaking, and to which we now return as compared to the sea-trout, yet to be noticed, has a large mouth, dark within; the general complexion of the skin, particularly about the head, is of a deep brown color; the spots are bright, and the pectoral fins often of a reddish tinge.

A fish in good condition, of a pound weight, measures fourteen inches in length. The color of the flesh is various in different waters, in some it is of a cream-color, in others white, which is the most usual, and in others, again, of a pink or

salmon hue, depending, no doubt, upon their food. If any, however, deserve the name of salmon-trout, it should be those only which resemble the salmon in the *color* of the flesh, since in that particular the salmon *never* vary, which the trout often do.

Though their average size and weight is much the same, but falling short of that which is usually ascribed to them ; still there is in every water some peculiarity by which the fish may be distinguished, some being darker, some of a more shining hue, and some of a fuller form. And there are also exceptions as to the fact of the uniformity of their size, for they are known, in one stream to be of a very minute description, not longer than *minnows*, yet perfectly formed and beautiful fish, while in another stream the average is large, and small fish seldom seen.

Two pounds may be considered large, yet they sometimes attain the weight of three. To give, however, a better idea of the usual size, we should say, that after a day's fishing, and having returned to the water such as were too small to keep, the balance would generally compare to the standard of herrings, a fish well known for their uniformity in this particular.

But here it may be remarked, that it is this very variation in size, so peculiar to the trout,

which is the delight of the angler. His skill is constantly liable to be put in requisition, and should he succeed in securing a larger fish than ever he had previously taken, his prime object is accomplished. He exults in the *size*, as an offset to the *numbers* taken by the companion of his sport.

It has been correctly remarked, that they will seize upon any small object in motion on the water, for which reason, unless they happen to be particularly dainty, it is unnecessary to be very curious in the selection of a fly, — as a proof of this, and at the same time of their well known voracity, we remember to have taken a trout of about a pound weight, when on disengaging the hook, something like a string was observed to hang out of its mouth. This proved to be the tail of a *mouse*, which we drew from the throat of the fish in a partly digested state. This circumstance happened in the town of Tyngsborough, in a beautiful stream, which take it for all in all, is as a trout-brook, the very beau ideal of the angler's imagination, and is one fact, to which many others might be added, that they are not over particular in their food.

We shall mention but one more, occurring in the town of Sandwich, in the well known "Monument River." On opening a fish of about

the same weight, the stomach was found to contain a stone — we will not be so indefinite as to say "about the size of a piece of chalk," but weighing an ounce and a half.

It may be hence inferred that the fish in this river or estuary, as it may be called, are rather short of food, which is the fact, — they are consequently poor and in bad condition, feeding on *sand-fleas*, and a few minnows, and are the most inferior of all the sea trout, peculiar to a part of the country to which we shall presently refer.—The sensibility of the angler is relieved by the belief that, in fish, the organs of feelings are somewhat obtuse. If this is true, the opponents to the sport are disarmed of the only argument which can be alleged against it, viz: its cruelty. If, however, they mean to apply the charge not only to the fish, but to the worm or other living bait with which they are taken, the fly-fisher at least, must be exempted from such an imputation. The impaling of the writhing worm does no violence to his *tender* sensibility, neither does the lively minnow quiver upon his hook.

Provided with his book of flies, he pursues the pleasure of his sport guiltless of its only objection. Still farther, to remove what is urged against fishing on the score of its cruelty, we may notice how frequently the trout is hook-

ed a *second* time, with the hook which but a few moments before his struggling had detached, fixed firmly in his jaw. In fact, the loss of a favorite fly, is generally attended with the consolation that it may be thus recovered again.

Once angling with the bait by the side of a friend, we *struck* a trout, and he shortly doing the same, on raising our rods, a fine fish was suspended between us. It was judged to belong to him whose hook was deepest. We have heard it said that it was necessary to the existence of the fresh water trout that they should periodically visit the sea, but this notion is too ridiculous to deserve a serious contradiction. The innumerable obstructions of our rivers and rivulets now-a-days, most effectually prevent it. On the contrary we say farther, that there is a small description of trout often found in such streams as flow into the tide waters, that have this opportunity without availing themselves of it. They are not only natives of the stream, but live within its confines all the year round.

Alas! that the manufacturing interest should clash with the success of the *fisheries!* It is not that we complain of these obstructions as preventing the fish from going down to the sea; we should be content to find them *still* where nature placed them. But now, they are dispersed and degen-

erated in quality, the waters are poisoned, and the legitimate current of the rivers, like the present course of politics, is forced into new and *untried* channels; so that in the anguish of our hearts, adopting a distich to the teeming times, and blending the patriot's apprehension with the angler's regret, the thought occurs to us that

> "*Nullification* is vexation,
> *Division* is as bad —"

For such is the creed of him who is both a lover of his country and its enjoyments. But if fortunately chance should have directed his thoughts and steps to a more favored scene —

> "—— Where purple violets lurk
> With all the lowly children of the shade —"

there, having passed a day of temperate pleasure, far from the world of strife, having tried conclusions with none but the companion of his toil, or the victims of his skill, he lingers till "the evening shades prevail," then homeward-bound returns, his basket heavy as his heart is light.

By the influence of a distinguished individual who occasionally indulges in angling, as a relief from the cares of an arduous profession and a public life, an act of the Legislature of Massachusetts

was passed, imposing a penalty of fifty cents for each trout taken in any other way except with the rod and line. It is to be regretted however, that the intention of extending the protection of the law to this estimable fish, has not been altogether realized: the law exists, but is disregarded.

Factories and saw-mills have done their part towards the work of extermination, and the destructive *net* bids fair to do the rest. But though much diminished from these causes, there are more or less waters all over this state, and particularly in Plymouth county, and Barnstable county on Cape Cod, where the fish live and thrive in the undisturbed possession of their element.

In no place, however, do we remember to have seen them in such abundance as in Duke's county, upon Martha's Vineyard; and it is perhaps from this very circumstance that they are held in so little estimation, the preference, as an article of food, being given to the silvery "neshaw eel," as it is called; neither has the pleasure of taking them ever entered into the minds of the people. It may well be supposed then, how favorable these circumstances must have proved, not only to their preservation and wonderful increase, but also to their attaining that respectable growth which entitles them to the name of "*old settlers*." It was here in the month of November last, and of course

in their spawning time, while returning home from a ramble among the heaths and hills of Chilmark and Tisbury, that crossing the principal brook of the island, our attention was attracted towards the agitated state of the waters, and never do we recollect so fully to have realized the expression of its being "alive with fish," as on this occasion. As we carelessly descended the course of the brook, they were constantly rushing before us, but on a closer and more careful inspection, they might be discerned lying dormant in the gravelly shallows with their back fins out of water, watching their spawn, occasionally darting out, as danger in the shape of some unwelcome intruder approached the object of their care.

Departing once more from the intention of confining these remarks to the trout of Massachusetts alone, it may be here stated that with the exception of the Vineyard alone, there is no place within our knowledge where they appeared to be so numerous as in the river at *Dennysville*, in the state of Maine. They were in all respects like those we have been describing. They were found in all parts of the river, but more particularly in certain spots where a cold brook entered and mingled with its waters, called *trout-holes*; in such places they were congregated in immense numbers.

Had these been the only object of a visit to a part of the country and a stream, which considering their numerous attractions to the eye of the angler, may be viewed as unequalled, there would have been ample field for gratification. But on the contrary, being prepared, and fishing for salmon, their numbers proved rather annoying, than otherwise.

At this time, the late season, and some other obstacles, interfered with the success of our endeavors to take the salmon with the rod, line and artificial fly; an achievement which had been rarely attempted, and probably never accomplished, unless by foreigners, except in the single instance of one of our party, who on a previous visit to this wild river, in a more propitious season, had the good fortune to realize that object, which is said to constitute the apex of the angler's ambition.

Proceeding with the order in which we arranged the three principal varieties of trout peculiar to this state and its vicinity, we come now to the last, and by far the most esteemed, viz: — the *sea-trout*. They are found, as may be inferred from the name, in the salt and brackish waters of tide rivers, creeks and inland bays, in various parts of this and the adjoining states. But with the exception of "*Fire-Place*," on Long Island, we are not aware of their being known in the same plen-

ty and perfection as in "*Waquoit Bay*," upon Cape Cod; a place of well known resort, and to which our remarks will more particularly apply. Waquoit Bay is a large expanse of shallow water upon the southern shore of Cape Cod; it was so called by the aborigines, who in this respect were governed by the suggestions of nature, from the resemblance of the sound of the word to that which is emitted by the male quail at the time of incubation.

A number of small streams are discharged into it, which render its waters slightly brackish, and it has but one narrow outlet to the sea. The soil in the country generally, but particularly in the neighborhood of this bay, is of a sandy, sterile quality, but nature, which has been rather niggardly in this respect, has made ample amends, not only in the superior quality of the trout of which we are speaking, but of other fine fish, such as eels, basse, &c., with which its waters abound.

There is another neighboring bay, called "*Popponesset*," upon the same shore, (scarcely less famous for the sea-trout than Waquoit,) into which the celebrated Marshpee river flows, perhaps the greatest resort of anglers in New England for the sea-trout, after they have begun to ascend the fresh water streams. When taken from the salt water early in the spring, they are in high perfection,

and nothing can exceed their piscatory symmetry. The general appearance of the skin is of a silvery brightness; the back being of a greenish and mackerel complexion; the spots of a vermilion color, mixed with others of a faint yellow, and sometimes slightly tinged with purple, extend the whole length on each side of the lateral line; the fins are light in color, firm in texture, and together with the tail are rather shorter and more rounded than in the common trout; they have a firm compactness of form from head to tail, which accounts for the superior sprightliness of their motions; the head and the mouth are very small, and the latter never black inside like the common or fresh water trout; the flesh is even redder — or rather, we should say, more pink-colored than the salmon, to which by many, they are preferred as a delicacy, having, like the salmon, much of what is called the *curd* or fat between the flakes.

A fish of a pound weight, measures about eleven inches in length. Their average size is considerably larger than the fresh water or brook trout — having been taken in the waters to which we refer, of nearly five pounds weight. Such instances however, are rare, three pounds being considered a very large fish. We may here remark respecting their size, that it is considered very good luck when after a day's fishing ten or a dozen will average a

pound each, and we have a recollection of a few days only which have shown a greater result; we mean to each individual. We do not remember of ever seeing a poor fish of this kind taken; they are invariably in good condition, let the size be what it will; their principal food is the minnow and the shrimp, particularly the latter, with which, early in the season, their stomachs are found to be filled; they feed upon the minnow rather later in the season, when the increasing warmth of the water invites it to leave the warmer springs of fresh water, where it has passed the winter, and venture into the shallows round the margin of the bay; it then becomes an easy prey to the voracious trout, which pursues it with desperate boldness to the very feet of the angler as he stands in the water, obliging it in shoals to leap from the surface, and sometimes even to be cast on shore in its attempts to escape his hungry jaws. There is a place called *minnow-cove*, where they are very plentiful, particularly in the boggy marsh holes, in which they collect in the spring so abundantly, that half a net full may be sometimes taken at a single *dip*.

At this time, however, they are out of the reach of the trout, though they are on the whole, the best bait; the shrimp on the contrary, living as they do among the eel-grass in the bay, which

also affords shelter to the trout, being more within reach, may consequently be said to supply their principal food, at least through the winter months. As it is necessary in the pursuit of all game to be governed by a knowledge of its particular food, so it may be said of the sea-trout, their motions while in the salt water being regulated by those of the minute fish upon which they live. Both minnows and shrimps are more or less affected by the action of the tide, particularly the latter, which in its reflux sweeps the *passive* shrimp in shoals across a sandy eddy of the bay into the very mouths of the expectant trout, who there collect and lie in wait to feast upon them.

It may be hence inferred that the shrimp is a good bait, and so it is,— the only objection to it, is that of its not being sufficiently *tough* upon the hook, and therefore *stolen* with such ease by the fish as to require very frequent rebaiting; in this respect, the minnow has the advantage, and may be considered the established bait for the sea-trout.

If ever so well provided, it would be in vain to fish in the broad waters of the bays to which we allude — an occasional trout is sometimes taken while following the edge of the eel-grass which forms the channel, but it is not the way to fill the basket. They are governed, as we have ob-

served, by the operation of the tide upon the bait, which occasions their collecting in two well known rendezvous or sand spits which project into the bay, forming a current favorable to the purpose of their resort.

To give some idea of the numbers which are occasionally taken, it may not be amiss to state that upon one of the points alluded to, being the one of least note, and forming a sort of narrow to a division of the bay, we perceive by a memorandum made at the time, that two persons took eighty sea-trout, the weight of which, including two baskets four pounds each, was fiftynine pounds. This was on the fourth of April, the wind west, flood tide most of the time, and the bait equally shrimp and minnow. Though the artificial fly is by no means used for sea-trout, with much success, before they are led by instinct to change the nature of their food with the element in which it is formed, yet it is customary in this sort of fishing to have a red fly, as it is called, but more strictly speaking, a caterpillar, permanently attached to the line; this with one bait, either the shimp or minnow, is the common practice, by which two fish are often taken at the same time, and occasionally three, as we have once seen, when the three varieties of bait were used together.

There is another sandy point, and the only one in the bay, named Poponessett, previously alluded to, which forms one side of the channel called "Sampson's Narrows," not less famous for the size and quality of the trout than Waquoit, though not so remarkable for numbers. A basket of twenty pounds capacity is often filled in this spot, at one tide, and it is worthy of notice that, probably on account of the action of the current upon the various sand-bars, the *flood* is decidedly best upon this of which we are speaking, while in the other bay the *ebb* tide is preferable. If we should be called upon to give a preference to the trout of any particular place over all the others which we have seen, the decision would be in favor of those of Sampson's Narrows, as possessing all the fine qualities heretofore enumerated in the sea-trout, with compactness of form and richness of flavor in a more remarkable degree.

With a view to make further discoveries of the resort of fish, we have followed the shore of one of these bays, so far as the very outlet to the sea. No addition, however, was made to the stock of knowledge already possessed. The only trout which was taken at this outlet, confirms the fact often noticed in other places, that the nearer they are taken to the sea, and the salter the water, the more they possess the greenish color peculiar to

the back of the mackerel, as well as a more dazzling and silvery brightness, compared to those living in waters at all brackish. That some idea may be formed of the size of the fish, not unusually taken in these waters, and particularly at the sandy point last referred to, we may state the circumstance of our having caught, a few years since, on the 24th of March, three trout, which together weighed eight and a quarter pounds — two of them approaching very nearly to three pounds each, besides many others at the same time, over a pound, their stomachs being filled with shrimps; on this occasion both wind and tide were favorable — the latter for sea-trout being much the most important.

We have now to mention a well known and by far most frequented spot in all these waters, called "*Poket Point*," in Waquoit Bay. Its name like that of the bay, is no doubt of Indian origin, and agreeably to the custom already referred to, might have been given to it for the very simple reason of its poking out in so striking a manner as to form those singularly abrupt projections from the shore or main land, generally known by the name of "*Sand Spits*." Be that as it may, it is a very remarkable place, and for many years, has been no less the resort of the angler, than the great abundance of fine sea-trout which

form the object of his visits. But to describe it more particularly. Having proceeded about a quarter of a mile, or it may be nearer a half, from the landing place, (which by the way is that point we have previously mentioned as being the second best,) along the fringed upland which skirts the marsh, we come to a gently sweeping curve of the grassy shore ; on the other side there is a similar curve or swell of the bay, both of which, inclining together towards the extremity, form the celebrated spot of which we are now speaking. It is a few hundred feet from the upland to the end of the point, which at low water particularly, is a mere sand bank, and upon which there is no other vegetable growth to be seen except the coarse, rank beach grass, so peculiar to the sterile shores " of the stormy Cape Cod."

The distance between high and low water mark upon the point, is but a very few feet ; indeed, the tides in these land-locked bays are so much governed by the force and direction of the winds that it is frequently difficult to tell whether it is high or low, rising or falling ; in moderate weather, however, there can be no doubt, and the calculation of high water in this bay, is about two hours later than the almanac. At low water, there is a *wading-place* from near the point to the opposite shore which forms one side of " *Child's*

River," the current of which sets against the point and adds to its advantages as a resort for the fish, especially if the wind happens to be in an opposite direction, for the froth which is consequently collected upon the surface, is what the trout, beyond all other fish, so much delight in, and they are seen at such times, jumping their whole length out of water, their bright broad sides glistening in the sun.

This state of things however, is not always the most favorable for fishing; for at such times it may be sport to the fish, but by no means to the angler; few in fact are taken upon the surface, and they evince little or no acquaintance with the artificial fly, that which we have heretofore mentioned being a sort of decoy, serving but to attract their attention towards the more deadly bait. One circumstance, adding very much to the pleasure of fishing at this, and indeed at other points of a similar character, is that of the line never becoming entangled, or the hook *fouled*, the action of the current, particularly at ebb tide, which for reasons in relation to the bait, is the best time, being such as to keep the line always free. Neither is there much annoyance from the hideous *sculpin*. It does occasionally happen however, and is a misfortune soon ascertained by the heavy strain upon the line, and the dead weight upon the hook; we

are consequently prepared to *deal* with him as soon as he reaches terra firma, which is not always realized without serious consequences to an apparatus, a little too delicate for this species of fishing.

Though we profess to feel nothing like a morbid sensibility, nor to expend our small stock of compassion upon this maritime monster, yet we have feeling; but it would be affectation to say that under these circumstances we have no ill will towards the sculpin, considering the great disappointment he has occasioned us by not being a trout.

We would not however, torment this much abused fish by thrusting a stick into his jaws and turning him adrift, thereby putting an effectual veto upon his "biting times," as some of our children do; we would merely put him out of harm's way as effectually and as speedily as possible, with that tenderness which a due regard to his feelings and our own comfort may dictate. His indomitable love of his native element, is evinced by frequent short and powerful jerks, but finally having baffled his spirit of opposition, and with quite as much regard to the safety of our *tackle*, as to his views of a change of element, dragged the unwilling monster to the sand, we disregard the angling rule, by which one should

"Gently disengage, and in the stream again indulgent throw."

but on the contrary, with feelings by no means propitiated in his favor by the threatening erection of his horns, and his obvious objection to a restoration of the hook, first having disposed of the rod by placing it in the only safe position, that is, in an upright one, by means of the spike, then take the staff of the landing net, which is also armed with a spear, for this and other purposes, seize a quiet moment as he lies upon the shore, and force it quickly through his head into the sand, by which operation he is instantly and therefore humanely, deprived ever after of an indulgence in his propensities of smelling, biting, and jerking; we then withdraw the handle of the net from the sand, with the impaled sculpin "dead as a herring" upon it, after which, his mouth being open for the first time since the enjoyment of his personal acquaintance, the hook is disengaged with perfect convenience. Finally, the handle of the net acting as a powerful lever, the unfortunate "*sea-devil*" is cast from it with that force and to that distance which settles the question of further annoyance; then into the water, splash he falls like Lucifer, never to *bite* again.

But enough, perhaps too much of sculpins — let us therefore return to the trout. Their only screen from the view of the angler at the point, is the depth of the water, and it is for this reason, as

they can probably see though not seen, that a breeze upon the surface is absolutely necessary. There must be a *ripple* so as to render objects, if they *are* seen, at least *broken* and *indistinct* to the fish; even a very light breeze, which comes particularly favorable from the southeast and south, added to the tide current is sufficient, but nothing can be done in a calm. It is true that on first throwing in, a few fish are taken, laying as they do when undisturbed, near the sand-bank in watch for the bait; but the effect of the natural timidity peculiar to the species, is to make them recede farther and farther, until being out of his reach,—the angler, notwithstanding his having pursued them half leg deep, finally abandons the sport until a more auspicious time. Favored, however, by the united circumstances of tide and wind, plenty of bait, and the established equipments, he has every prospect of all the enjoyment which he anticipated. But the idea of enjoyment, to those not of the fraternity will appear rather enigmatical, when it is premised that he stands for hours at a time over his knees in the water, (and here it may be remarked, by way of parenthesis, that as but two or three can fish, conveniently, at one time, upon this and the other similar points, they certainly, having the ground to themselves, have no desire to refute the maxim of *de gustibus non est*

disputandum,) but it does not follow that his feet, though cold, are wet, being protected by his impervious india-rubber *leggings*, in which, after some hours' pressure of the water, there is not the least appearance of moisture, except what arises from the natural exudation from the skin.

Even as early as February, the trout may be taken in this and other places, and as before observed, are in high perfection; but the cold, at this season requires to be guarded against, and the angler is consequently supplied with a *pea-jacket*, as it is called, among his other defences; his dress, in fact, is regulated according to the season, March, April and May being the most favorable months. Though by no means giving it the *preference*, he likes the fishing because he likes the *fish*, and more particularly, for its novelty, being the first fruits of the season.

His other gear, as varying strictly from fly-fishing, are these: the rod should be rather longer and stouter, though, well managed, the fly-rod may be used without danger and with still greater convenience.

Casting lines may be used or not, at pleasure, but a single shot of the size called B. is absolutely necessary. A very minute swivel is used for the double purpose of spinning the bait and preserving the line from *snarling*. Several spare hooks, already

ganged upon silk-worm gut, must be at hand to repair losses, as well as shot previously split. Short casting lines will be necessary only in case of using a small red or gaudy fly, of which a slight stock should also be provided. The meshes of the landing net should be small, for the purpose not only of landing, or it may be said dipping up the fish, but also for catching the live bait. If the net is carried as recommended in fly-fishing, under the left arm, the fish should be unhooked *over* it, so that if it happens to drop, it will drop into the net and not into the water. A japaned box is strapped round the waist, with apartments for the two kinds of bait. The winch and line are the same as that described for fly-fishing. The pocket book is well supplied with materials to refit, repair, and replenish, and the basket, if not carried upon the back, is left in a convenient situation near the edge of the water.

There have been incredible numbers of trout taken at the celebrated point to which we more particularly refer; hundreds, and perhaps we may say thousands every year, nor is it perceived, on the whole, that they are diminished in proportion. From particular causes, however, generally attributable to the state of the weather, there are seasons of scarcity; as a proof of this, we may mention the circumstance which happened a few years

since, of a change of temperature attended with snow, which suddenly succeeded a few uncommonly warm days, during which the trout, invited by the warmth of the water, rather than governed by the early season, began to change their quarters and ascend the streams, agreeably to the instinct of their nature. The consequence was, that chilled by the snow, the streams and shallows near the shore became a mass of *sludge*, whence the trout, dead and dying, were collected in great numbers, as well as from the edge of the marshes, where they were left by the receding tide. The mortality was such as to occasion a perceptible diminution in the quantity and size of the fish, on that as well as the following season.

Instances of this nature are, however, of rare occurrence, but we wish that as much could be said of the shameful practice of NETTING, which, under pretence of taking herring, is annually perpetrated, more particularly in *Child's* and *Quashnut* rivers, in defiance of the well known law against it. It may be said of this and every other place, where trout are found, that fair fishing never thinned their numbers yet.

Since upon Poket Point, there is nothing to screen the angler, on first approaching, it is best to be cautious, particularly if it happens to be a calm time. It not unfrequently happens that two

persons on first throwing in, will both instantly take *double game*, as it is called.

If it is late in May, two of them may be striped Bass, which we have seen repeatedly taken together; for it is in May that these fish run in from the sea. At that time they are in such fine condition that there is no reason to regret the chance of taking one occasionally, if it were for nothing else but to give variety to the repast in anticipation. After premising that there is never a day in the season of fishing, but more or less trout may be taken at this point — always enough to *eat;* — still, to give a better idea of the numbers, though perhaps incurring the charge of dry detail, we would now refer to such days as have been considered fortunate; and we mention them only as coming within our own observation, and such as every frequenter of these waters must also have experienced.

April the twentysecond, two persons took twentyseven pounds principally upon this point: a great part of the time the tide was ebb, and of course favorable, but the wind being north-east, by no means so, which is one of the many proofs of their capriciousness for the want of a better reason, already adverted to. The angler, of all persons, therefore, should never despair. On the ninth of April — the year is of no consequence —

two persons took, in the same spot, fiftyeight trout, weighing thirty pounds; and this gives a correct idea of their average weight of half a pound, many being not much over a quarter, a considerable number up to a pound, and but few reaching the weight of two pounds and over.

It would be well if some who are in the habit of angling here, would remember the petition of the fish in the fable, and release all trout under the size of minnows, instead of basketing every one they catch, merely to swell the number, without regard to weight, beside the detriment to future sport — such conduct is a wanton sacrifice of life, which no true angler will countenance.

On the seventh of May, twentynine pounds were taken by two persons, the number of fish not known, but probably between fifty and sixty. We shall merely add as an instance of the greatest result of fishing at the two principal points here alluded to, of which we have any recollection, that in the middle of April 1829, there were taken by two persons, in five day's fishing, 296 sea trout, weighing 191 pounds. On one of the five days the number was eightytwo, and the weight sixty-one pounds, thirty fish of one of the parties weighing thirty pounds and a quarter, and the largest two pounds and eleven ounces. The wind and weather on the whole were favorable, but even

when otherwise, it made, as sometimes happens, but little difference in the sport

By a singular coincidence, though in perfect *keeping* with the genius of the place, the names of Phinney, Fish and Handy, are among the occupants of the surrounding soil. To those who desire to be near the scene of action, the house of the former affords substantial comforts, while that of the latter has been from time *immemorial* the *point d'àppui* of the visiter, let him come from where he will. It is here that we commence the note of preparation, arrange the *tackle* and select the bait. It is here we often linger upon the sunny slope that fronts his lowly cot, or seated at the window, watch the sluggish tide, or favoring breeze; or if detained within, we listen to the aged veteran, while with kindling enthusiasm he conjures up a series of such incidents as form the *humble* part he took in achieving his country's independence, or dwells with doting fondness and cheering satisfaction, upon the circumstance of his eyes having once been blessed with the sight of the glorious Washington and Lafayette, as the brightest reminiscence of his unpretending history. Grateful for the pittance of his country's bounty, he contrives to live; his utmost wants all realized in the necessaries of life. But still, without the treasures of the sea, his boat and spear, it might

go hard with the aged pensioner, whom we have sometimes seen of a calm dark night engaged in the picturesque process of *eeling;* the boat gently cleaving the smooth surface; a bright fire kindled in the bow; his attenuated form standing erect in the centre, and seen by the glare of light in strong relief contrasted with the murky darkness around, darting his spear at times into the lurid water; then like a trident brandishing it aloft, the very personification of old Neptune himself.

As a short digression from our subject, but connected with eeling — an occupation so essential to the poorer inhabitants, that the eel spear may be called the staff of life — we have to state the circumstance as related to us, which happened in these waters some fifty years ago, of an Indian who one dark night was *beset* by a host of wild geese. Attracted by the bright glare of the flaming pine knots, they approached his boat in a dense black mass, croaking most vehemently, rushing at the fire, which they soon flapped out and scattered with their wings. His only defence was his paddle, and this he laid about him with such effect to prevent the canoe from sinking by their numbers, that on reaching the shore with great difficulty, he found his cargo unexpectedly consisting of wild geese instead of eels.

Having now noticed the principal bays and

points, where the sea trout are found in the greatest numbers and perfection, compared to all the other tide waters in the state, we proceed to mention the two well known rivers, into which upon the return of warm weather they begin to migrate, called Child's and Marshpee rivers, or in other words, we speak of the sea trout in fresh water. The first mentioned river is shallow and will be found more or less brackish according to its proximity to the bay into which it runs; the banks are not wooded, and it receives the water of a brook that takes its rise in springs and bogs at only a short distance from the head of tide waters, or rather we should say where the fresh water is backed by the impulse of the flowing tide. As this brook is altogether unfavorable for a mill, on account of its short and sluggish character, the trout have uninterrupted access to its head waters, where they repair in spawning time, but seem in no haste to run in any great numbers at an earlier period of the season, which fact is peculiar to this stream, and no doubt is to be accounted for by the greater abundance of good feed below.

Occasionally this boggy brook affords good diversion in its few approachable parts, but generally speaking they are found collected in one or more of the little shallow basins, a successive chain of which forms this peculiar river. It has neither

shelving banks, or rocks, or brush, the only *cover* for the fish being a green spongy weed at the bottom, and so easily detached by a little too much wind, as to be very annoying to the angler. Indeed there is an end of fishing whenever this substance is inclined to float upon the surface, as we have often noticed in this, as well as other rivers. Child's River however, though by no means possessing the rural charms in which the fly-fisher so much delights, or the difficulties which it is his ambition to contend with and overcome; has no superior as a place favorable to the practice of the incipient state of the art, particularly on account of its freedom from the usual impediments, enabling the angler to cast his fly without difficulty. In this water we have found the same red fly already mentioned, very successful, as also others of a bright and showy description, which certainly for sea-trout are the most killing. And here it would not be amiss to mention the materials composing this fly, and forming the great dependence of the angler for sea-trout. The hook is small and of the kind called *limerick*, ganged of course upon silk worm gut, the snood of which may be the whole length of the gut if used for a *stretcher*, but if used for a *dropper*, either with another fly, or with the bait, it should be but three or four inches long, and the gut of the stiffest kind, to prevent its winding

round the casting line when wet, as it is inclined to do. Its distance from the end fly or stretcher is about three feet, but if bait is used, it should be at least double that distance. Its body or dubbing may be made of red worsted, mohair or floss silk, the last being neatest, and objectionable in all flies only on account of its greater liability to hold the water. Then comes the *hackle*, from the neck feathers of a white rooster dyed red, which is wound round the body, making a very simple *fly*, so called, but more resembling a caterpillar, as it will be observed it has no wings.

When three flies are used, there can be no better arrangement for them than the following. The first drop-fly, to be thirty inches from the stretcher, the gut only four inches long, and of the stoutest kind. The second drop-fly to be thirtyfive inches from the first, and the gut eight inches long. The advantage of observing this fixed distance between the flies, is that of their all three coming in contact with the water in the ordinary position of the line after it is cast.

Highly as we appreciate it as a pleasing resource to the angler, and forming one object for the exercise of his skill, it is not intended to add to these remarks our own experience in the art of fly making; it will however be proper to state the names of those mentioned in the books on

angling — where ample directions may be seen — of such as are said, and we have proved to be, *standard flies,* that is, such as are found to be good at all times and in all places. They are the palmer flies, namely, the red hackle, yellow hackle, grouse hackle, etc ; and wing flies, such as the green drake or may-fly, the march brown, and indeed any and all of that class of insects known by the name of phryganeæ and ephemeræ, to which may be added the grasshopper as well as beetles, for " there is hardly any insect that flies, including the wasp, the hornet, the bee and the butterfly, that does not become at sometime the prey of fishes."

If the angler has half a dozen of each of the palmers, as well as a small stock of the wing flies above alluded to, he may be considered well provided, particularly if he has also feathers and other materials to repair his loss in case either variety should be exhausted. The manufacture of flies is a very nice operation, and more suited to the delicate fingers of females, by whom they are principally made in England, Scotland, &c. The very best of them are but rude imitations of nature, but the practised eye will distinguish at a glance those that are made by rule, from those that are made by a novice in the art. From our own experience we have been of opinion that quite as much stress is laid upon the necessity of an infinite variety of

flies as is consistent with fact; neither do we believe that the most killing will prove to be such flies, as at the time the trout happen to be taking. For on the contrary we have often noticed that a totally different fly may be used with success, and it may too, be unlike any insect in creation, for which reason, they seem to give it the preference. There are however certain general rules to be observed, such as a dark fly for a bright day, and a bright fly for a cloudy day; a small fly for calm water and a larger one for a rapid. The great difficulty in fly making is in the wings, nay, it is not only difficult but impossible to imitate with anything like truth to nature, those little reticulated gossamer transparencies, neither would the flies be any better if we could.

A judicious selection of feathers then is all that can be done; they have the advantage of any substance more delicate, which would not bear the use. The smaller the fly the more difficult it is to make, and this accounts for the artificial ones being so out of all proportion; though we do not believe they are any the worse for it. Indeed it would be a very difficult thing not only to procure a hook sufficiently small, but to make a fly so very minute as to be scarcely perceptible on the water. It frequently happens, in a calm time, that the surface is covered with an insect so small

that they could not be perceived by the fish if it was at all agitated by the wind. At such times the trout are rising in all directions, apparently in sport, but upon examination they will be found to have fifty or more of these little specks collected in the throat. To imitate the size then is out of the question, the most we can do is to come as near as possible to the colors, and if we have nothing like it in our collection, to make one upon the spot, though it may be twenty times as large.

But enough of calms, the test of an angler's skill. The most showy and therefore the most killing salmon flies, resemble nothing which skims the air; after the body requiring great nicety in the operation of tying, they are principally made up of a mass of the most gaudy feathers possible; well arranged, gay and attractive as the butterfly, and intermingling their tints like the prismatic colors of the rainbow. Such are the Irish flies of Martin Kelly, some remarks upon which, taken from an English Magazine, we here subjoin, as they apply to fly fishing and fly making in general.

"I would recommend every man who aspires to be a first rate salmon fisher, or is likely to have frequent opportunities of enjoying that noble sport, to learn the art of fly *dressing*. The occupation is agreeable, and the pleasure of killing a

salmon with those of one's own manufacture is infinitely greater than that afforded by doing so with the handy-work of any other artist. The dressing an Irish fly is, it must be admitted, a tedious, and to do it neatly, rather a difficult operation, and requires not only practice in the mere mechanical part of the process, but likewise considerable judgment in the selection and adaptation of the component parts. Any man who has been taught to *tie* flies, may imitate a pattern correctly enough; but it is not so easy a matter, without a model, to select and mix a good wing, and choose the colors of the body, legs, head, &c., so as to make a judicious whole. The merely being able to tie a neat and pretty looking fly, is not sufficient; something more is wanting, and this something, most men whether regular tackle makers, or amateurs, want, and nothing but experience and careful and minute observation will supply the deficiency."

Having made this long *détour* from Childs' River, we now return to it, for the purpose merely of stating the numbers and size of the fish taken at one particular time. It was on the eighteenth of May 1829, that two persons — one of whom was an English gentleman, a "brother of the angler," to whom we are principally indebted for the small stock of practical skill we possess — took seventy fine sea-trout, weighing thirtyeight pounds. A

number of the largest weighed about a pound and a half, but none over. They were nearly all taken with the fly, and most of them with three or four varieties of those standard flies already mentioned, namely, the red and yellow palmer or hackle, the march brown, and grouse hackle. The time on the whole was favorable, though the sun was out, the wind blowing up the river, mild and gentle.

There is another river which flows into Waquoit Bay, known by the Indian name of Quashnut. In its tide waters the sea-trout are sometimes collected in considerable numbers. It is at best however an uncertain place, and never can amount to much as a trout stream on account of the mill which obstructs their progress to its upper waters, to say nothing of the stealthy practice of seining, before mentioned. And here it may be remarked that the effect of a mill, as it respects the trout in a stream, depends very much upon its location. If it is high up and near the source, its operation is far less unfavorable to their annual upward tendency, as many instances might be adduced to prove, but if on the contrary, as in the instance of the stream last mentioned, the fall happens to be such that the mill is erected upon the lower waters, it proves an effectual barrier to their migrations, and they desert the stream for one more congenial to

their nature. As it respects this mill, it is a more desperate case for the fish, than indeed where the communication with the brook is entirely cut off, since the improvement of the dam for factory purposes, and the consequent alteration of a waste way, that now falls in a lofty cascade. We have been surprised that this arrangement was permitted, since it effectually shuts out the herrings as well as the trout, the former being so essential to the support of the poorer class.

We remember in the olden time, when every drop of water was by no means so precious as it is now-a-days, that while passing this dam, on our way to "Poket," it was a common thing to be accosted by the worthy miller, with an offer of large trout, which of course we always rejected, expecting to take larger and better ourselves, neither did we altogether approve his *modus operandi*, simple enough to be sure, as may be seen by what follows. Observing that the trout, in their efforts to struggle through what is called the waste way, were cast back again by the force of the *gorge*, into one particular shallow of the stream; he there drove a circle of stakes, making a sort of pound, from which there was no escape, and whence the trout thus confined, were taken at pleasure. We remember to have noticed the same invention, though upon a larger scale, in Canada, at the up-

per bridge, that crosses the Jacques Cartier River. A view is given of this wild scene in Mr Vignes "Six Months in America," taken by himself, representing the identical personage with whom we conversed on the subject of the salmon, while on a journey in the month of August 1826. But the circumstance alluded to, being noticed in a short journal of one of the parties, and also applicable to our subject, we therefore subjoin an extract from it.

"At seven o'clock we arrived at the beautiful and romantic spot called Jacques Cartier Upper Bridge. Though on a smaller scale, it resembles "Trenton Falls," in the rude features of nature, the river having worn a deep passage in the solid rock, through which the impetuous water foams and tumbles in its progress towards the mighty St Lawrence.

Two pedestrian highland officers had arrived from Quebec on an excursion for salmon fishing, the spot being celebrated in its facilities for the enjoyment of this sport. With great civility, one of them perceiving that we were strangers and travellers, accosted us, and imparted all the information possible in the half hour that we were able to devote to the enjoyment of this interesting scene. It was with great reluctance that we looked with the hurried glance of the passing traveller upon a prospect so truly picturesque, and above all, at the

only place where we had ever yet visited where the art of angling is enjoyed in its greatest perfection; but so it was — we were bound to Cape Saint to lodge, and even if we had been disposed to stay, the tavern, which was also the toll-house, appeared much too small to accommodate our party without dispossessing the said officers, who had already taken up their quarters there.

"The salmon are taken with the rod, line and artificial fly, and often in an eddy of the river very near the bridge. The water here has scooped out a vast hollow in the rock; in this the salmon were to be seen in the morning when the sun shone, doggedly still, because seeing as well as seen, but as the officer observed, all his efforts to allure them by the most enticing flies, proved ineffectual, though he confidently expected better success early tomorrow morning; and well he might, for we understood from the tollman, in French, that four were taken yesterday with the hook, one of which weighed eighteen pounds.

"On the other side of the bridge, up the river, there was also an elbow in the rock, forming a sort of natural trap, where the salmon, in attempting to leap a rapid, were forced back into a small pool, from which they were taken and removed to another and more secure pen; out of this our informant took one with a dip net, weighing about three pounds, a

size in England called grilse. Though out of season and very indifferent, it proved a valuable addition to our viands, cleanliness being a more striking characteristic of Canada, in summer, than good cheer. On the flat surface of the rock, we were shown the deep prints of feet, as they are called; they have something of the form, to be sure, but are without doubt the natural effect of the torrent, which when the river is swollen, covers these places, and has at some time or other, whirled round loose pebbles within them, so as to produce, by abrasion, these peculiar forms. It was with regret that we bade adieu to this gem of creation."

The other stream which we proposed to notice, as being remarkable for its sea-trout, is called Marshpee Brook or River, and takes its rise from the Marshpee or Wakeby pond, flowing through the plantation of the Marshpee tribe of Indians, adjoining the town of Falmouth and Sandwich, it empties into the before mentioned Popponesset Bay. Like many other streams, it is called both a river and a brook, though it is well understood that when the former term is used, it applies to its lower waters, and vice versa.

We have little to say of its river part, except that being much deeper than the one last described, the trout are taken sometimes through the ice, in the winter and early spring, in certain deep

parts, known by the familiar names of the Crow's Nest, Amos's Landing, &c. And here it may be remarked that, go where you will, let the scene and the country be ever so uninteresting and indescribable, there is hardly an acre of ground or water unprovided with its appropriate name, some of them very ludicrous, and all familiarly known by the occupants of the soil. Though this is observable throughout the country generally, it is more particularly so in all our Indian settlements, and in that to which we have alluded as much as any. Mixed and degenerate as they are, it is still gratifying to see here and there the slightest vestiges, and they are few, of the primitive customs of the sons of the forest. One of these, if not still extant, must have been so at no very distant period, and is that of stopping to rest at certain spots in the roads, (once paths) indicated by a considerable pile of dried sticks, and called "Indian Taverns." These are still visible in many places, and were sustained by the practice of each individual who passed casting a stick upon the heap

But alas! even these Indian Tumuli, if they may be so called, are gradually sinking to decay, an indication of that total extinction, sure and certain, which awaits those with whom they originated. Where is the warlike front, the firm step, the native pride, the majestic bearing, — where is

the feathered mantle, the gaudy plume, the deadly arrow, and the elastic bow, — where is the friendly wigwam, and the calumet of peace, — where? — all *civilized* away. Disgrace not the name of Indian, by applying it to that squalid, mongrel race who halt exhausted at an Indian tavern; *they* bear the white man's poison, *they* stop to drink, where once their ancestors, with solemn purpose, cast a bough upon the landmark pile as a propitiatory sacrifice to the Great Spirit; but at length a too potent spirit has sacrificed them, their civilized and degenerate descendants.

One of the most interesting remains of Indian antiquity is to be seen upon the banks of Cotuit brook, on the land of the venerable and worthy Gideon Hawley, Esq. one of the overseers of the Marshpee tribe. It is a large tumulus, so obliterated by time as hardly to attract notice, but on examination a regularity of form is perceptible. It is an oblong square, but not much elevated. There are trees upon it of a considerable size and spontaneous growth. The tradition is that of its being the grave of a large trout, which having forced its way and pioneered the herrings from the sea, was there taken and buried. This is ridiculous enough, as most Indian traditions are; but should an excavation ever be made, there is but little doubt that the labors of the antiquarian would be rewarded with

a sufficiency of bones; they would, however, be of those the Indian, and not of the trout.*

From the peculiar nature of the stream, the fishing of Marshpee Brook may be considered as perfectly *sui generis*. We have seen the time, when, as beginners, we had no objection to it, particularly on account of the *great hauls*, with which we sometimes even *astonished the natives;* but as that time has gone by, and nothing short of doing the thing *secundum artem* will satisfy us now; we shall say merely a few words for the benefit of all those "pot-fishers" that care more about the end than the means.

It may then be inferred, from what we have said, that the use of the fly in this stream, is out of the question, and so it is; from one end to the other, with very little exception, its banks are covered to the water's edge with a dense mass of primeval foliage, so close, the broad limbs embracing and intermingling from either side, and "wreathing

* On a recent visit to Cotuit, having visited this Tumulous or "Trout-Mound," as it is there called, the form was found to be rather oval than oblong; an egg cut longitudinally in halves, will best convey an idea of its shape. We also learnt that some years since, an excavation was caused to be made by D. L. Child, Esq. whose expectations in bringing something to light, interesting to the antiquarian, were not realized. We are still of opinion however, that had the work been prosecuted to a greater extent, a satisfactory result would have followed.

their old fantastic roots on high," as effectually to screen the view of the water. The only way to fish in Marshpee brook, therefore, is by wading; and fortunately, its hard, gravelly bottom, so uncommon in other brooks, but remarkable in this, renders it perfectly practicable.

Notwithstanding our present predilection for what we conceive to be a greater refinement of the art, our thoughts must often recur to Marshpee and its interesting associations, as being our first love. Many are the friends who must reciprocate in the gratification of having *wet a line* together in this enticing stream, of which it may be truly said, our lines have fallen in pleasant places; and among those of the most pleasing kind is blended the recollection of a successful day, passed with one whom we delight to honor, and one whose skilful management in alluring the speckled captive was, as it were, emblematical of that transcendent talent, which, as a statesman and a "fisher of men," has since made captives of us all. And here it may be observed, that if great names were required to sanction the diversion of angling, and give it a preference, we can refer to Salmonia, that vade mecum of the angler, not only for authority of such a character, but for arguments founded on its rational enjoyment as a philosophic pursuit.

Halieus there says, "I can find authorities of

all kinds, statesmen, heroes and philosophers; I can go back to Trajan, who was fond of angling. Nelson was a good fly-fisher, and as a proof of his passion for it, continued the pursuit even with his left hand. Dr Paley was ardently attached to this amusement; so much so, that when the Bishop of Durham inquired of him, when one of his most important works would be finished, he said, with great simplicity and good humor, "My lord, I shall work steadily at it when the fly-fishing season is over," as if this were a business of his life. And I am rather reserved in introducing living characters, or I would give a list of the highest names in Britain, belonging to modern times, in science, letters, arts, and arms, who are ornaments of this fraternity, to use an expression borrowed from the freemasonry of our forefathers.

Physicus. — I do not find much difficulty in understanding why warriors and statesmen, fishers of men, many of whom I have known particularly fond of hunting and shooting, should likewise be attached to angling; but I own I am at a loss to find reasons for a love of this pursuit among philosophers and poets.

Halieus. — The search after food is an instinct belonging to our nature; and from the savage, in his rudest and most primitive state, who destroys a piece of game, or a fish, with a club or spear, to

a man in the most civilized state of society, who employs artifice, machinery, and the resources of various other animals, to secure his object, the origin of the pleasure is similar, and its object the same; but that kind of it requiring most art may be said to characterise man in his highest or intellectual state; and the fisher for salmon and trout with the fly, employs not only machinery to assist his physical powers, but applies sagacity to conquer difficulties; and the pleasure derived from ingenious resources and devices, as well as from active pursuit, belongs to this amusement. How delightful in the early spring, after the dull and tedious time of winter, when the frosts disappear and the sunshine warms the earth and waters, to wander forth by some clear stream."

To this feeling, whether as fly-fishers, or more general anglers, we most cordially respond, and not the less so as it applies to the stream in question, among other favorite resorts, for the circumstance of the necessity of wet feet. There are sundry places where it is customary to enter Marshpee Brook, either higher or lower, according to circumstances. To stem the current and fish upwards, is out of the question, and never practised, neither should we recommend ever "tracing up the brooks," though unimpeded by trees, if it were for no other reason than the derangement of the line,

which constantly occurs by its flowing towards you; an inconvenience which never happens while descending. In this brook, however, the agitation of the waters in ascending and thereby disturbing the fish, would be a sufficient reason for going with the current, its operation being such as to guide the bait, and often by the minutest aperture; into those deep recesses whence the monarch of the brook is drawn *vi et armis*, as he struggles to recede into his dark haunt; in fact, as there is no *sea-room* to *play* a fish, the tackle should be altogether of a stouter description than that which is confined to the use of the artificial fly.

The rod for instance should be but eight or ten feet long, with a very stiff top joint — a longer rod cannot be used with convenience on account of the trees. It must have a winch or reel attached, and rings through which to pass the line of ten or fifteen yards in length, and made of silk. The hooks should be of rather a large size, and if ganged on silk worm gut, so much the better. A swivel will be required, and at least one large shot of the size of B.

The angler should have a supply of all those materials before recommended, to repair his losses, which in this brook of all others, on account of the large size of the fish, and more particularly

the obstructions in its course, are so likely to occur. Let the rod be of what kind it will, there should always be a spike in the butt, for a rod should never be suffered to lay upon the ground or fall into the water, particularly in a current, which is sure to sag down the line and do such mischief as a little pains might have prevented. He should have his fish pannier at his back, and never be without his landing net under the left arm, for reasons before stated. A clearing ring is also often required in a brook like this. The meshes of the net may be either small or large, as the minnow, though always a good bait, is not used in this stream. The practice is to procure a fresh herring, and after having scaled it, make three longitudinal cuts on each side, and then transverse cuts, so as to reduce the whole shiny part of the herring to square bits about double the size of dice. To keep this bait in a convenient situation for use, either a small basket attached to the pannier, or a tin box, with air holes in the top, is necessary.

We have mentioned a reel as essential, though it is not for the usual purpose of holding a long line to play and drown the fish, as in more open waters; but for the purpose of governing the length of the line with greater convenience, as it becomes often necessary, in order to insinuate the bait under the

bushes, or guide it near some frothy *hummock*, to leave but one or two feet beyond the end of the rod. In such places, sometimes not larger than a hat, to all appearance, but often extending under the banks of the stream to the length of the rod, the trout on coming from the salt water take up their abode, and also disperse themselves, under every log, stone, bank or bush, calculated to afford them *cover*. It is a peculiar kind of fishing, and requires both caution and patience.

The angler should descend the stream so moderately as not to *rile* the water more than possible, and stand a moment before coming to a favorite bend or bank, for the cloud to pass off and the water to become quiet, before he casts his bait into the tempting whirl. On striking, that is, hooking the fish, time should be given to gorge the bait a little, neither should it be done with violence for fear of either breaking the rod, or jerking the line and hook into a tree over head, which, of all things is a difficulty most apt to try one's patience in this brook. To guard against this latter inconvenience, it is best to have a hook, made to screw into the rod of the landing net, for the purpose of drawing down a limb that may be out of reach, in order to disengage the line.

There are a small species of trout in this stream which are what we call natives, and do not visit the

lower parts of the river; they are easily distinguished from the sea-trout by their yellow sides, scarlet bellies and red fins. The latter however not only retain their silvery appearance, but grow brown on the back and black on the head, and in the mouth, according to the length of time they have been in the fresh water. It is said that they come up with the herrings, but the number taken by the herring fishers in their hand nets is so few, as to establish the fact, not only that they run in the night, but of their continuing to ascend from the bay or mouth of the river, long after the herrings have passed into the Wakeby pond. Their bright, *fresh run* appearance as well as their large size and numbers, may be mentioned in further confirmation of their running more or less all summer long. For though the fishing may be tolerable by the middle of May, the greatest show of fish has always been taken in the middle of summer. At this time herring bait of course is not to be had, minnows, if possible, or worms, are then substituted. The largest sea-trout in the State, have been taken in this brook; we believe nearly up to five pounds; two and three being by no means uncommon. But we would repeat again that the average size is much smaller than is generally admitted, and we should sooner call it half a pound than two pounds, as it has been erroneously stated; indeed we

should go farther, and call the average much less even in the best day's fishing, if every trout, great and small is "basketed," for it all depends upon the number of those that are rejected and returned to the stream.

This is one of the brooks that does not suffer by a mill, that which is upon it, but now in decay, being so near the outlet from the pond as to be no impediment to the course of the fish towards their cold-spring haunts, neither do they incline to penetrate into the still and warmer waters of the pond; but prefer invariably to spawn in the gravelly shallows of the running water, for which it is so remarkably adapted. In fact, to all frequenters of the *Cape*, it has been for generations, renowned for the purity and coolness of the waters, the abundance of shelters, the size and plenty of fish, and indeed for every quality that constitutes a most perfect trout-stream, with the single exception of its being, from its wild state, unfavorable to the use of the artificial fly.

Since we have mentioned worms as a bait, and not remembering to have seen any direction for the process of what is called *scouring*, it may not be amiss to introduce it here; for if they are used at all, they are much improved by the operation, both as it respects their being cleaner and more lively.

First, get some clean meadow moss ; wash it and wring it nearly dry, then fill a vessel of the shape of a gallon measure. Let some common earth worms be dug, of a middle size, enough to fill half a pint ; put the worms as fast as dug into a basin of clean water ; take all that are alive and not broken, of a suitable size, and put them in a heap upon the top of the moss, into which on the following day, they will be found to have buried themselves, leaving the earth with which they were filled, upon the surface. The moss and worms must then be taken out, both washed separately, the broken worms picked out, and the living ones placed as before. This, if repeated two or three times will be sufficient, and will render them bright, clean and lively, in which state they may be kept, occasionally sprinkling the moss with a little milk, for many days.

As it respects the sea-trout, we have confined our remarks thus far to a few particular places, but it is proper to state that though the last mentioned water is the main resort of visiters to Sandwich, whence it is distant about ten miles ; that town is the most remarkable for its abundance of this fine fish of any other in the State ; so much so, that it was for years frequented not only by those who delight in the pursuit of angling, but also by those who set quite as much value upon them as one of

the greatest delicacies of the table. It was there they were once taken in great numbers and eaten in the highest perfection. It was there that the hot air of the city was exchanged for the pure and piny fragrance of the Cape. It was there the comforts of a public house were once realized to the heart's content. But alas! the glory of Sandwich has departed, and "Fessenden's" exists no longer, except in the remembrance of those who have enjoyed its luxuries and the kind attentions of its respected host.

Besides this lamentable change from what was once justly considered the best house in the country, to its opposite extreme; the corrupting influence of a foreign population has proved, in this instance, the usual scourge of a village, so that now it may be said, Sandwich *fuit*, and even "John," the guide of the young angler, has seen his best days! Deep as our regret may be for this deterioration, occasioned less by the diminution of the fish than the substitution of a low tavern, we do not say grog-shop, for a public house, which from its superior excellence under its former landlord, was of itself sufficient to give character and celebrity to a village; we have yet the consolation left us of changing our head-quarters to that beautiful oasis in the desert of pines, called Cotuit. This charming settlement, which to its honor be it said, was nev-

er permitted to be cursed with a "bar-room," so called, is now without a public house. We therefore refrain from saying anything in its commendation, as a starting point of the angler; except that we are among the favored few who are still permitted by our obliging friend, Ezra Crocker, Esq. though having taken down his sign, to make his house our home.*

We mention this place as by far the most convenient location, either for early or late fishing, to say nothing of its various other charms as a summer resort; yet all the places, to which we have alluded, may be visited with great convenience from Sandwich, requiring only a little more time in going from place to place. For whether you reside at one or the other, your excursions will depend upon the season of the year. If early in the spring before the sea-trout have begun to run, they will be to the narrows of Popponesset bay, to

* As a proof of the salubrity of the village of Cotuit, as well as the primitive temperance of its occupants, it may be remarked, that for the space of 20 years, a physician has not been called to the family of Mr Crocker, with one exception, and that was to a child, now a blooming young lady, who was on a visit to the family. The physician being from home however, and the patient mending, his services even in this solitary instance were finally dispensed with. The father and mother of Mr Crocker died at the advanced age of 80. Their sons and descendants, together with Mr Hawley and the Rev. Mr Fisk, are the principal occupants of the village.

Waquoit bay, to the lower waters of Marshpee river, and to Monument river, &c.; but if later in the spring, and in the early summer, though Marshpee brook will be the great dependence, the various other places where the sea-trout are found are almost innumerable; for there is not a rivulet that flows from the springy banks of the upland into the creeks of the salt marsh, but contains more or less. Among the most celebrated, however, are the two tide rivers in Sandwich, called Scusset, and Scorton, to the former of which, once without its equal, we may again apply the word *fuit*, for it has now suffered from the usual effects of a mill. As to the smaller streams, that which crosses the Barnstable road and enters the salt meadows, about four miles from Sandwich, near the Quaker Meeting-house, has, from our own experience, sometimes yielded great results; in fact, it may be said that the whole country is full of trout, and not confined, though peculiar to this town, for they abound in the neighboring towns of Falmouth, Barnstable, Wareham, Plymouth, etc., and to come nearer home, Marshfield, of which last, by the way, out of regard to the tenacious notions of such friends as view the ground their own by a sort of prescriptive right, but for which we can feel no sympathy, we forbear to make that particular mention which it justly merits.

Having thus considered the three principal varieties, viz: the natural pond or lake-trout, the river or artificial pond-trout, and the sea-trout, both in salt and fresh water, as connected with the art of angling, and with the exception of the first description, as applied to the state of Massachusetts, the few remarks with which we conclude, will be of a more miscellaneous character, and are such as have been overlooked in our progress thus far.

The trout being a very timid fish, seldom rise or take the bait, either when seeing or seen, it is therefore necessary to keep out of sight as much as possible. Indeed it is necessary that the angler should steal upon them with the cunning of a fox; and we have a friend in our mind whose great success is founded upon his observance of this rule. He uses the bait only, but always keeps at a respectful distance from the water.

The fly-fisher, if he has learnt the art of throwing the fly, may proceed with less caution; his greatest delight is to overcome distance by the length of line, rather than by the length of the rod. Lines are generally made of an equal size from one end to the other, but a better way is to make them like a whip-lash, that is, larger in the middle than at the extremities, for this gives an impetus in casting the fly. The best rods will be

found to have a small piece of wire moulded on the joints where they unite ; this is intended to tie them together by a silk thread, to prevent the awkward predicament of throwing rod and all into the water, one of the miseries of anglers, and a thing that often happens, unless so prevented.

Since we are upon nice points, though we hope not more nice than wise, we will observe still further, that the silk thread should be waxed with bees' wax, and not with shoemaker's, that it may be unwound with greater convenience, this being the only use in all the apparatus, to which the former is put in preference to the latter. Shoemaker's wax is absolutely essential, both as holding the work together and resisting the action of the water. The silk thread should be left hanging upon the joints ready for use, which if it is a three-joint rod, as recommended, will require but two wooldings, and gives very little trouble. Before putting a rod together, the end of one joint (*without* a brass ferrule, as advised,) which goes into the ferrule or socket of the other, should have a little hard grease applied to it, to prevent its swelling and adhering, so that it cannot be taken apart ; oil will not do. If, however, on account of rain, or falling into the water, it should stick fast, which often happens, it should not be forced, but the brass held in the flame of a candle, when by

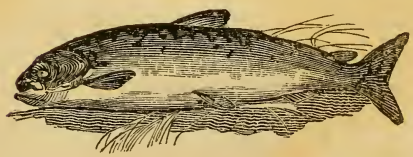
the expansion of the socket, it will soon cease to bind.

In bait-fishing, on feeling a fish, do not jerk the bait out of his mouth, or give him a toss over your head into the interior, but instantly drop the end of the rod a little, then raise it with a brisk motion; this is striking with a better chance of hooking effectually, the bait being more or less gorged. There are, however, two objections to this practice, effectual as it is, in which fly-fishing has greatly the advantage, one is that of giving pain to the fish, allowing it has feeling — and another is the difficulty of disengaging the hook, when deeply fixed in the throat. Should this be the case, always withdraw the hook first through the gills forcibly, with the thumb and finger of the left hand, then placing the fore-finger of the right hand upon the point while there, bring it out of the mouth. Observing this rule, the instrument called the disgorger will be unnecessary, for the hand that holds the line, and the finger shielding the point, answer a better purpose. With the artificial fly, however, the affair of striking a fish is reversed, the eye must be constantly directed to the extremity of the line, and the fish struck the instant it breaks water. Quickness of sight is absolutely necessary to success in fly-fishing, and those who do not possess it, and are, besides, *constitutionally clumsy*,

had better give it up in despair. It is a very convenient way to hook into the hat, that is, by the point of the hook of the fly, and a pin in the other end of the snood, such flies as may chance to be wanted, to the amount of half a dozen, or more. A three-joint rod, such as we have described for fly-fishing, should have a spare middle and a spare end-joint, which will be much the same as two rods, as the butt seldom or never breaks; it will then consist of five pieces. A bright sun is always unfavorable to fishing, and if calm at the same time, still more so, but a bright sun with a good breeze is better than a cloudy calm. The glassy surface of the water must be broken that objects may appear indistinct to the fish; for this reason a shower, particularly in its commencement, is very favorable, but if on the contrary it has continued so long and with such violence as to render the water turbid, and to gorge the fish with feed washed into it from the shores, such a time is unfavorable, both for the bait and the fly. Unpleasant as it is to the angler, he should fish with his face to the sun, particularly in a calm time, lest the shadow of his person be cast into the water; this is not so material if there is a breeze.

To conclude; there exists among the fraternity, not only that kindliness of feeling towards each other which usually accompanies a kindred taste

in all pursuits, yet more particularly observable in that of the contemplative angler; but even a holier feeling often takes possession of his thoughts; and how can it be otherwise? — Once having felt, he never can "renounce the boundless joys that nature to its votary yields." He is cheered by the radiance of the rising sun; he breathes the balmy air of morning — soothed by the humming stillness which prevails at noon; the feathered songsters greet his ear, mixed with the brawling brook, "that down the distant rocks hoarse-murmuring falls." — He contemplates with wonder all the secrets of the insect tribe; he hears, he feels, he sees that nothing is made in vain; he looks "from nature up to nature's God."



ERRATA.

Page 29, eighth line from bottom, for *asseous*, read osseous.
" " last line, for *æsophagus*, read œsophagi.
" 37, in reference marked C., for *oracle*, read auricle.
" 46, fourth line from top, for *caudal*, read caudal.
" 49, third line from bottom, for *sclerotic*, read sclerotica.
" 57, fifth line from top, for *which to*, read which by.
" 59, sixth " " " *oviperous*, read oviparous,
" " " " " " *condropterygii*, read chondropterygii.
" " seventh " " *viviperous*, read viviparous.
" " tenth line from bottom, for *andromous*, read anadromous.
" 60, ninth " " for *expregnate*, read impregnate.
" 63, tenth " " for *oviperous*, read oviparous.
" 68, third line from top, for *Branchiostagous*, read Branchiostagious.
" 79, eighth " " *Vedious*, read Vedius.
" " tenth line from bottom, for *lest*, read less.
" 80, in some of the impressions for *Celachii*, read Selachii.
" " ninth line from bottom, for *chein de mer*, read chien de mer.
" " tenth " " for *Scyltiam*, read Scyllium.
" 124, first line top, for *Dr Yates*, read Dr Yale.
" 145, ninth line from top, for *Block*, read Bloch.
" 168, fourteen lines from bottom, do. do.
" 173, twelve " " " for *he*, read it.
" 176, two " " " for *genera*, read general.
" 179, eighth " " " for *hirando*, read hirundo.
" 184, three lines from top, for *loche*, read loach.
" 187, two " " " do. do.
" 207, five lines from bottom, for *pluinosus*, read pruinosus.
" 208, sixth line from top, do. do.
" 226, twelfth " for *auguilliform*, read anguilliform.
Owing to a mistake of the compositor, in the whole article on Anguilla, the word is mis-spelt *Auguilla*.
" 236, last line before note, for *Idua*, read Idria.
" 237, first line from top, do. do.
" 264, eleven lines from top, for *cæcums*, read cœca.
" 271, three " " for *littoral*, read litteral.
" 304, last line from bottom, for *States*, read State.
" 306, head of page, for *Comberoides*, read Scomberoides.
" 307, sixth line from bottom, for *nest*, read net.

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